11-5820-530-15

# TM 11-5820-530-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT,
AND DEPOT MAINTENANCE MANUAL

# CONTROL, RADIO SET C6118/FRC-93

## (COLLINS MODELS 312B-4 AND 312B-5)

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This reprint includes all changes in effect at the time of publication; changes 1 and 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1964

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No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *15 July 1965*

## Organizational, DS, GS, and Depot Maintenance Manual

## CONTROL, RADIO SET C-6118/FRC-93 (COLLINS MODELS 312B-4 AND 312B-5) INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

TM 11-5820-530-15, 25 June 1964 is changed as follows:

Change the title of the manual to: ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL, CONTROL, RADIO SET C-6118/FRC-93 (COLLINS MODELS 312B-4 AND 312B-5) INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST.

*Page 1.* paragraph A.3. Delete subparagraph *c* and substitute:

*c. Reporting of Equipment Manual Improvements.* The direct reporting of errors, omissions, and recommendations for improving this manual by the individual user is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U. S. Army, Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N. J. 07703.

*Page 19*, paragraph 6.1. Delete paragraph 6.1.

*Page 18*, appendix. Delete appendix and substitute:

## APPENDIX I
## REFERENCES

| | |
|---|---|
| DA PAM 310–4 | Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Catalogs (Type CL), Supply Bulletins, Lubrication Orders, and Modification Work Orders |
| SB–11–573 | Painting and Preservation Supplies Available for Field Use for Electronic Command Equipment |
| TB SIG 291 | Safety Measures to be Observed When Installing and Using Whip Antennas, Field Type Masts, Towers, Antennas and Metal Poles, That Are Used With Communication, Radio and Direction Finder Equipment |
| TB SIG 364 | Field Instructions for Painting and Preserving Electronic Command Equipment |
| TM 9–213 | Painting Instructions for Field Use |
| TM 11–5820–529–15 | Organizational, DS, GS, and Depot Maintenance Manual: Transceiver RT–718/FRC–93. (Collins Model KWM–2 and 2A) and Power Supply PP–3990–FRC–93. (Collins Model PM–2), Including Repair Parts and Special Tools List |
| TM 11–5820–532–15 | Organizational, DS, GS, and Depot Maintenance Manuals Amplifier AM–3979/FRC–93 (Collins Model 30L–1) |
| TM 11–5820–554–15 | Organizational, DS, GS, and Depot Maintenance Manuals Radio Set AN/FRC–93, Including Repair Parts and Special Tools List |
| TM 38–750 | Army Equipment Record Procedures |

Add Appendix II after appendix I.

# APPENDIX II
# DIRECT AND GENERAL SUPPORT AND DEPOT REPAIR PARTS LIST

## Section I. INTRODUCTION

### A2–1. General

*a.* This appendix lists the quantities of repair parts for direct support, general support, and depot maintenance and is a basis for requisitioning authorized parts. It is also a guide for depot maintenance in establishing initial levels of spare parts. This equipment is combat essential.

*b.* Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Source, maintenance, and recoverability codes indicate the supply service responsible for supply, the maintenance category at which an item is stocked, categories at which an item is installed or repaired, and whether an item is repairable or salvageable. The source code column is divided into four parts as follows:

(*a*) *Column A.* This column indicates materiel code and designates the area of responsibility for supply. AR 310–1 defines the basic numbers used to identify the materiel code. If the part is Signal materiel responsibility, the column is left blank.

(*b*) *Column B.* This column indicates point within the maintenance system where the part is available. "P" indicates that the repair part is a high mortality part; procured by supply services, stocked in and supplied from the supply depot system, and authorized for use at indicated maintenance categories.

(*c*) *Column C.* This column indicates the lowest maintenance category authorized to install the part. O —Organizational maintenance (operator and organizational). F—Direct support maintenance.

(*d*) *Column D.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items items are indicated by NX. Expendable items are not annotated.

(7) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(8) *Direct support.* This column indicates quantities of repair parts authorized for initial stockage for use in direct support maintenance and in supply support to organization. The quantities are based on 100 equipments to be maintained for a 15-day period.

(9) *General support.* The number in this column indicate quantities of repair parts authorized for initial stockage for use in general support maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(10) *Depot.* The numbers in this column indicate quantities of repair parts authorized for depot maintenance and for initial stockage for maintenance, and for supply support to lower categories. The entries are based on the quantity required for rebuild of 100 equipments.

(11) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustration of the equipment. The numbers in the "Figure No." column refer to the illustration where the part is shown.

## A2–2. Parts for Maintenance

When this equipment is used by Signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

## A2–3. Additional Repair Parts Authorization

An asterisk indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

## A2–4. Requisitioning Information

*a.* The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for initial stockage for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \text{allowable factor} = \text{Number of parts authorized for initial stockage.}$$

*b.* Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts auththorized is less than 0.5, the quantity authorized will be zero.

(2) When the total number of parts authorized is between 0.5 and 1.0, the quantity authorized will be one.

(3) For all values above one, fractional values below 0.5 will revert to the next lower whole number and fractional value 0.5 and above will advance to the next higher whole number.

*c.* The quantities determined in accordance with the above computation represent the initial stockage for a 15-day period.

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EIIP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | CONTROL RADIO SET C-6118/FRC-93 | | | | | | | | |
| | P1 | F | | 6625-995-3884 | | AMMETER: D'Arsonual movement dc; internally illuminated; Collins Radio part #498-0467-00 | | | 1 | 1.0 | 0.5 | 5.0 | 1 | M1 |
| | P1 | O | | 5995-993-9501 | | CABLE ASSEMBLY, RADIOFREQUENCY: Collins Radio part #426-6026-00 | | | 1 | 0.7 | 0.3 | 10.0 | 3 | |
| | P1 | O | | 5995-990-8662 | | CABLE ASSEMBLY, SPECIAL PURPOSE ELECTRICAL: audio cables with phone connectors; Labtronics Inc part #C102-48 (NOTE: See Table I page I) | | | 5 | 1.7 | 0.9 | 90.0 | | |
| | P1 | F | | 5910-814-6449 | | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 43 uuf ±1%; 500 vdcw; MIL type CC30LN430F | | | 2 | 1.0 | 0.5 | 12.0 | | C5,C6 |
| | P1 | F | | 5910-064-2244 | | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 470 uuf +100 -20%; 500 vdcw; Sprague Electric Co. part #19C372 | | | 4 | 1.5 | 0.8 | 24.0 | 10 | C2,C3,C4, C5 |
| | P1 | F | | 5910-806-6103 | | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 uuf ±20%; 500 vdcw; Sangamo Electric part #N23-500M | | | 2 | 1.0 | 0.5 | 12.0 | 10 | C3,C4 |
| | P1 | F | | 5910-280-8374 | | CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf +80% -20%; 500 vdcw; Erie Resistor Corp part #327047X5T0102Z | | | 4 | 1.5 | 0.8 | 24.0 | 9 | C7,C8,C9, C10 |
| | P1 | F | | 5910-846-5197 | | CAPACITOR, FIXED, PAPER DIELECTRIC: 0.5 uf +20% -10%; 200 vdcw; Sangamo Elect part #330205 | | | 1 | 0.7 | 0.3 | 6.0 | 10 | C6 |
| | P1 | F | | 5910-681-7029 | | CAPACITOR, FIXED, PAPER DIELECTRIC: 1 uf +20% -10%; 200 vdcw; Collins Radio Co. part #931-0170-00 | | | 1 | 0.7 | 0.3 | 6.0 | 10 | C1 |
| | P1 | F | | 5910-901-4377 | | CAPACITOR, FIXED, PAPER DIELECTRIC: Sprague Electric Co. part #160P2240A | | | 1 | 0.7 | 0.3 | 6.0 | 9 | C7 |
| | P1 | F | | 5910-636-3824 | | CAPACITOR, VARIABLE: glass; 0.5 uf min -3.0 uuf max; concentric type; Corning Glass Works part #682011 | | | 2 | 1.0 | 0.5 | 6.0 | 10 | C1,C2 |
| | P1 | F | | 5950-796-3120 | | COIL, RADIOFREQUENCY: Delevan Electronics Corp part #2500-42 | | | 2 | 1.0 | 0.5 | 10.0 | 10 | L1,L2 |
| | P1 | F | | 5950-812-4422 | | COIL, RADIOFREQUENCY: p/o Directional Coupler; Delevan Electronics Corp part #1537-92 | | | 2 | 1.0 | 0.5 | 10.0 | 10 | L1,L2 |

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | F1 | F | | 5950-679-9539 | | COIL, RADIOFREQUENCY: 60 turns of #30 AWG; toroidal wound; Collins Radio part #542-0916-002 | | | 1 | 1.0 | 0.5 | 5.0 | 8 | T1 |
| | F1 | F | | 5935-283-2910 | | CONNECTOR, PLUG, ELECTRICAL: u/w directional coupler to antenna; Automatic Metal Prod Co. part #0235 | | | 1 | 0.7 | 0.3 | 15.0 | 3 | |
| | F1 | F | | 5935-149-3483 | | CONNECTOR, RECEPTACLE, ELECTRICAL UG-58A/U | | | 2 | 1.0 | 0.5 | 30.0 | 2 | J1,J2 |
| | F1 | F | | 6625-896-7632 | | COUPLER, DIRECTIONAL: Collins Radio Co. part #543-8118-00 | | | 1 | * | 0.3 | 5.0 | 2 | |
| | F1 | F | | 5930-057-1844 | | HANDLE, SWITCH: Collins Radio part #544-2852-00 | | | 2 | 0.7 | 0.3 | 5.0 | 1 | |
| | F1 | F | | 5935-192-4729 | | JACK, TELEPHONE: MIL type JJ033 | | | 1 | 1.0 | 0.5 | 3.0 | 2 | J1 |
| | F1 | F | | 5935-774-6890 | | JACK, TIP: H.B. Jones part #201-11-01-018 | | | 6 | 3.6 | 1.9 | 18.0 | 2 | |
| | F1 | O | | 5355-160-7108 | | KNOB: Davies Harry Molding Co. part #1400M8LK | | | 1 | 0.7 | 0.3 | 3.0 | 1 | |
| | F1 | O | | 5355-971-0583 | | KNOB: Collins Radio part #543-8039-00 | | | 1 | 0.7 | 0.3 | 3.0 | 1 | |
| | F1 | F | | 5965-990-8669 | | LOUDSPEAKER: permanent magnet; 4-9 w, nom 3-4 ohms, 5 X 7 in oval; Utah Radio Prod part #8P57F | | | 1 | 0.7 | 0.3 | 3.0 | 2 | LS1 |
| | F1 | F | | 5905-186-3008 | | RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%; MIL type RC20GF101K | | | 6 | 1.9 | 1.0 | 60.0 | 10 | R1,R2,R4, R5,R6,R9 |
| | F1 | F | | 5905-190-8889 | | RESISTOR, FIXED, COMPOSITION: 270 ohms ±10%; MIL type RC20GF271K | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R14,R16 |
| | F1 | F | | 5905-192-3972 | | RESISTOR, FIXED, COMPOSITION: 390 ohms ±10%; MIL type RC20GF391K | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R13,R15 |
| | F1 | F | | 5905-257-2631 | | RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%; MIL type RC20GF821K | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R8 |
| | F1 | F | | 5905-295-6004 | | RESISTOR, FIXED, FILM: 10 ohms ±1%; 1/2 w; MIL type RN20X10ROF | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R1,R2 |
| | F1 | F | | 5905-542-7625 | | RESISTOR, FIXED, FILM: 5,360 ohms ±1%; 1/4 w; MIL type RN65B5361F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |

TM 11-5820-401-35

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | P1 | F | | 5905-615-7715 | | RESISTOR, FIXED, FILM: 5,620 ohms ±1%; 1/4 w; MIL type RN65B5621F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-542-7756 | | RESISTOR, FIXED, FILM: 5,900 ohms ±1%; 1/4 w; MIL type RN65B5901F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-577-9445 | | RESISTOR, FIXED, FILM: 6,190 ohms ±1%; 1/4 w; MIL type RN65B6191F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-583-5207 | | RESISTOR, FIXED, FILM: 6,490 ohms ±1%; 1/4 w; MIL type RN65B6491F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-542-7668 | | RESISTOR, FIXED, FILM: 6,810 ohms ±1%; 1/4 w; MIL type RN65B6811F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-725-7535 | | RESISTOR, FIXED, FILM: 7,150 ohms ±1%; 1/4 w; MIL type RN65B7151F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-542-7670 | | RESISTOR, FIXED, FILM: 7,500 ohms ±1%; 1/4 w; MIL type RN65B7501F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-577-0933 | | RESISTOR, FIXED, FILM: 7,870 ohms ±1%; 1/4 w; MIL type RN65B7871F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-556-3772 | | RESISTOR, FIXED, FILM: 8,250 ohms ±1%; 1/4 w; MIL type RN65B8251F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-725-3518 | | RESISTOR, FIXED, FILM: 8,660 ohms ±1%; 1/4 w; MIL type RN65B8661F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3, R4 |
| | | | | | | OR | | | | | | | | |

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | F1 | F | | 5905-581-1018 | | RESISTOR, FIXED, FILM: 9,090 ohms ±1%; 1/4 w; MIL type RN65B9091F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-785-6091 | | RESISTOR, FIXED, FILM: 9,530 ohms ±1%; 1/4 w; MIL type RN65B9531F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-556-3779 | | RESISTOR, FIXED, FILM: 10,000 ohms ±1%; 1/4 w; MIL type RN65B1002F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5910-810-4998 | | RESISTOR, FIXED, FILM: 10,500 ohms ±1%; 1/4 w; MIL type RN65B1052F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-556-6653 | | RESISTOR, FIXED, FILM: 11,000 ohms ±1%; 1/4 w; MIL type RN65B1102F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-688-3661 | | RESISTOR, FIXED, FILM: 11,500 ohms ±1%; 1/4 w; MIL type RN65B115 F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-619-8090 | | RESISTOR, FIXED, FILM: 12,100 ohms ±1%; 1/4 ; MIL type RN65B1212F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R3,R4 |
| | F1 | F | | 5905-811-9880 | | RESISTOR, FIXED, FILM: 787 ohms ±1%; 1/4 w; MIL type RN65B787OF | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-552-7206 | | RESISTOR, FIXED, FILM: 825 ohms ±1%; 1/4 w; MIL type RN65B8250F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-806-0323 | | RESISTOR, FIXED, FILM: 866 ohms ±1%; 1/4 w; MIL type RN65B8660F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | F1 | F | | 5905-542-7713 | | RESISTOR, FIXED, FILM: 909 ohms ±1%; 1/4 w; MIL type RN65B909CF | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-542-7764 | | RESISTOR, FIXED, FILM: 953 ohms ±1%; 1/4 w; MIL type RN65B9530F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-1869 | | RESISTOR, FIXED, FILM: 1,000 ohms ±1%; 1/4 w; MIL type RN65B1001F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-725-5312 | | RESISTOR, FIXED, FILM: 1,050 ohms ±1%; 1/4 w; MIL type RN65B1051F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-681-3222 | | RESISTOR, FIXED, FILM: 1,100 ohms ±1%; 1/4 w; MIL type RN65B1101F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-725-5313 | | RESISTOR, FIXED, FILM: 1,150 ohms ±1%; 1/4 w; MIL type RN65B1151F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-7504 | | RESISTOR, FIXED, FILM: 1,210 ohms ±1%; 1/4 w; MIL type RN65B1211F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-725-5314 | | RESISTOR, FIXED, FILM: 1,270 ohms ±1%; 1/4 w; MIL type RN65B1271F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-615-7716 | | RESISTOR, FIXED, FILM: 1,330 ohms ±1%; 1/4 w; MIL type RN65B1331F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-725-5315 | | RESISTOR, FIXED, FILM: 1,400 ohms ±1%; 1/4 w; MIL type RN65B1401F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | F1 | F | | 5905-577-6733 | | RESISTOR, FIXED, FILM: 1,470 ohms ±1%; 1/4 w; MIL type RN65B1471F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-681-8848 | | RESISTOR, FIXED, FILM: 1,540 ohms ±1%; 1/4 w; MIL type RN65B1541F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-0579 | | RESISTOR, FIXED, FILM: 1,620 ohms ±1%; 1/4 w; MIL type RN65B1621F | | | 1 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-804-3957 | | RESISTOR, FIXED, FILM: 1,690 ohms ±1%; 1/4 w; MIL type RN65B1691F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-0586 | | RESISTOR, FIXED, FILM: 1,780 ohms ±1%; 1/4 w; MIL type RN65B1781F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-7371 | | RESISTOR, FIXED, FILM: 1,870 ohms ±1%; 1/4 w; MIL type RN65B1871F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-615-7734 | | RESISTOR, FIXED, FILM: 1,960 ohms ±1%; 1/4 w; MIL type RN65B1961F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-681-8849 | | RESISTOR, FIXED, FILM: 2,060 ohms ±1%; 1/4 w; MIL type RN65B2061F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-615-7718 | | RESISTOR, FIXED, FILM: 2,150 ohms ±1%; 1/4 w; MIL type RN65B2151F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | F1 | F | | 5905-577-6766 | | RESISTOR, FIXED, FILM: 2,260 ohms ±1%; 1/4 w; MIL type RN65B2261F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |

| SOURCE CODE | | | | FEDERAL STOCK NUMBER | DESIGNATION BY MODEL | DESCRIPTION | UNIT OF ISSUE | EXP | QTY IN UNIT | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT | ILLUSTRATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | | | | | | | | | | FIGURE NO. | ITEM NO. |
| | | | | | | C-6118/FRC-93 (continued) | | | | | | | | |
| | P1 | F | | 5905-660-4151 | | RESISTOR, FIXED, FILM: 2,370 ohms ±1%; 1/4 w; MIL type RN65B2371F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | | | | | | OR | | | | | | | | |
| | P1 | F | | 5905-683-5014 | | RESISTOR, FIXED, FILM: 2,490 ohms ±1%; 1/4 w; MIL type RN65B2491F | | | 2 | 1.0 | 0.5 | 20.0 | 9 | R5,R6 |
| | P1 | F | | 5905-556-3348 | | RESISTOR, FIXED, FILM: 619 ohms ±1%; 1/2 w; MIL type RN70B6190F | | | 2 | 1.0 | 0.5 | 20.0 | 10 | R11,R12 |
| | P1 | F | | 5905-808-0546 | | RESISTOR, VARIABLE, COMPOSITION: 2,500 ohms ±30%; 1/4 w; Collins Radio Co. part #376-4738-00 | | | 1 | 1.0 | 0.5 | 10.0 | 10 | R10 |
| | P1 | F | | 5960-752-0243 | | SEMICONDUCTOR, DEVICE: MIL type IN82A | | | 2 | 1.0 | 0.5 | 10.0 | 9 | CR1,CR2 |
| | P1 | F | | 5930-996-4301 | | SWITCH, ROTARY: 3 pole, 3 position; Oak Mfg Co. part #89077E1 | | | 1 | 0.7 | 0.3 | 10.0 | 1 | S1 |
| | P1 | F | | 5930-996-4302 | | SWITCH, ROTARY: 5 pole, 3 position; Oak Mfg Co. part #189078J1 | | | 1 | 0.7 | 0.3 | 10.0 | 1 | S2 |
| | P1 | F | | 5930-996-4300 | | SWITCH, ROTARY: 1 circuit, 4 position, 1 section; Oak Mfg Co. part #192971F1 | | | 1 | 0.7 | 0.3 | 10.0 | 1 | S3 |
| | P1 | F | | 5950-959-4382 | | TRANSFORMER, AUDIO FREQUENCY: 200 to 20,000 cps freq range; Stancor Electronics Inc part #28849 (NOTE: Used in station control) | | | 1 | 1.0 | 0.5 | 10.0 | 2 | T1,T2 |

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
*General, United States Army,*
*Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,*
*The Adjutant General.*

Distribution:

*Active Army:*

USASA (2)
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(European Tropo-Army System) (200)
11th Air Assault Div (2)
GENDEP (Europe) (5)
Sig Sec, GENDEP (Europe) (5)
Sig Dep (Europe) (12)
Sig Fld Maint Shops (Europe) (1)

*NG:* None.

*USAR:* None.

For explanation of abbreviations used, see AR 320–50.

TM 11-5820-530-15
*C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *31 July 1973*

# Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual Including Repair Parts and Special Tools Lists

## CONTROLS, RADIO SET C-6118/FRC-93 AND C-7515/FRC-93 (COLLINS MODELS 312B-4 AND 312B-5)

TM 11-5820-530-15, 25 June 1964, is changed as indicated so that the manual also applies to Control, Radio Set C-7515/FRC-93 Title (page 1 of C 1). The title of this manual is changed as shown above.

*Page 1.* Delete paragraph A.2 and substitute:

### A.2. Indexes of Publications

*a. DA Pam 310-4.* Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

*b. DA Pam 310-7.* Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO'S) pertaining to the equipment.

Delete paragraph A.3 and substitute:

### A.3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions given in TM 38-750.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP PUB 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

*c. Discrepancy in Shipment Report (DISREP) (SF361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55-38 (Army)/NAVSUP PUB 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

*d. Reporting of Equipment Manual Improvements.* The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, U.S. Army Electronics Command, ATTN: AMSEL-MA-C, Fort Monmouth, N.J. 07703.

*Page 17.* After paragraph 5.8, add:

### 6.1. Applicability of Depot Overhaul Standards

The tests outlined in this section are designed to measure the performance and capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

### 6.2. Applicable References

*a. Repair Standards.* Applicable procedures of the depot performing these tests and the general standards for repaired electronic equipment given in TB SIG 355-1, and TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

*b. Modification Work Orders.* Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-7 lists all available MWO'S.

*This change supersedes Change 2, 25 January 1971, and so much of the maintenance allocation chart of TM 11-5820-554-15, 15 July, 1965, as pertains to the C-6118/FRC-93 and the C-7515/FRC-93.

## 6.3. Test Facilities Required

The following equipment, or suitable equivalents will be used in determining compliance with the requirements of this specific standard.

*a. Test Equipment.*

| Equipment | Technical manual | Common name |
|---|---|---|
| Test Set, Radio AN/URM-134A | | Radio test set |
| Multimeter ME-26D/U | TM 11-6625-200-15 | Multimeter |
| Wattmeter AN/URM-120 | TM 11-6625-446-15 | Wattmeter |
| Digital Readout, Electronic Counter AN/USM-207 | TM 11-6625-700-10 | Frequency meter |
| Voltmeter, Electronic ME-30E/U | TM 11-6625-320-12 | Electronic voltmeter |

*b. Additional Equipment.*

| Equipment | Federal stock No. | Ref desig. | Qty reqd |
|---|---|---|---|
| Transceiver RT-718/FRC-93 | 5820-082-4080 | | 1 |
| RF Amplifier AM-3979/FRC-93 | 5820-082-4081 | | 1 |
| Electrical Dummy Load DA-75/U | 5985-280-3480 | | 1 |
| 51.5-ohm RF Load, Bird 888 | | | 1 |
| Power Supply PP-4151/FRC-93 | 5820-985-8099 | | 1 |
| RG-58C/U Coaxial cable with RCA phono plug connectors 3501-M. | 6145-542-6092 | W3 | 2 |
| RG-58C/U coaxial cable with RCA phono plug 3501-M on one end and BNC RF male connector UG-88/U on other end. | | | 2 |
| RG-58C/U coaxial cable with type N connectors UG-536B/U. | | | 2 |
| RG-8/U coaxial cable with type N connectors UG-21D-U | 6145-161-0087 | W4, W5, and W6 | 3 |
| Two-wire shielded cable with one PJ-608 connector | | | 1 |
| Shielded cable with RCA phono plug 3501M on each end (CPN 426-2027-00). | | W1 and W2 | 2 |
| Two-wire shielded cable with one PJ-068 connector on one end and three binding post type terminals on other end, or PF-086 and binding post type terminals. | | W7 | 1 |
| Two-wire cable with RCA phono plug connectors 3501-M | | W8 and W9 | 2 |
| 600-ohm, 1-watt resistor RC20GF621J | 5905-279-1761 | | 1 |
| 100-ohm, 1-watt resistor | | | 1 |

*Note.* Length of cables not critical.

## 6.4 General Test Requirements

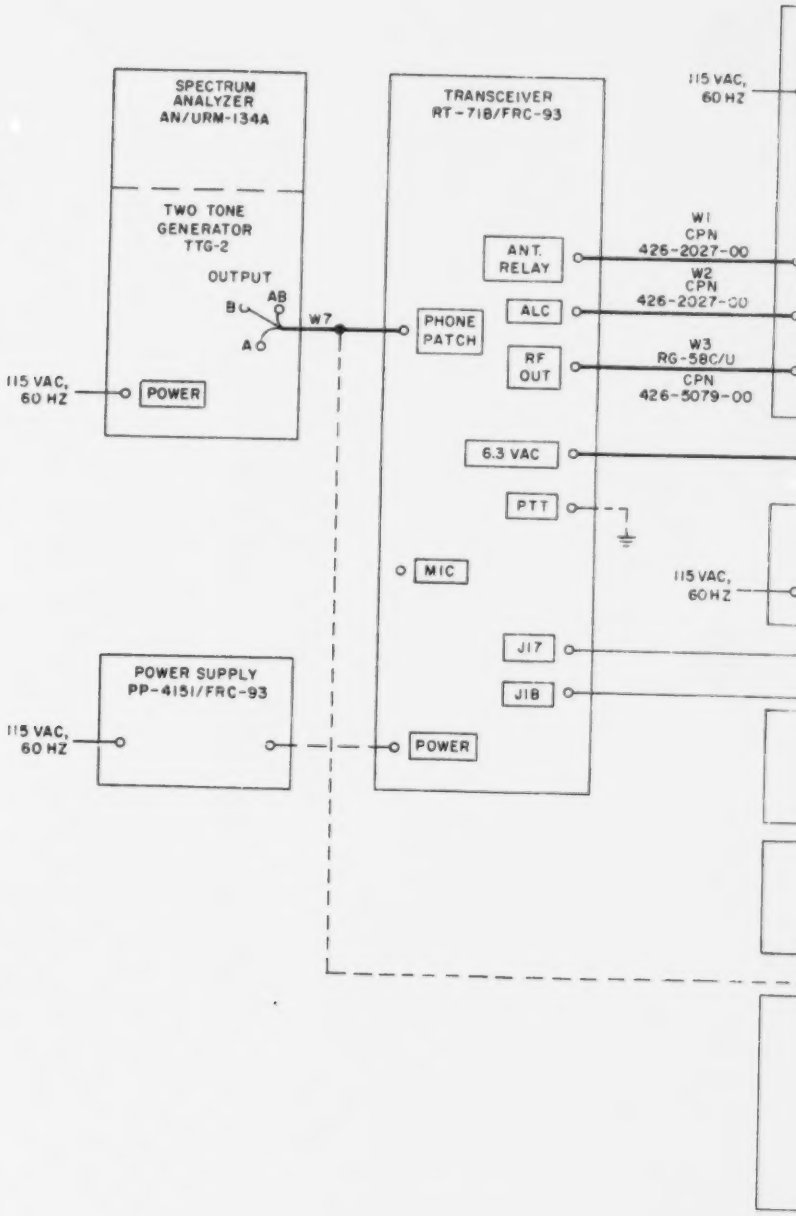
Tests will be initiated under the conditions listed below and as shown in figure 12. Perform the tests consecutively. Testing will be simplified if the connections listed below are made initially, and modifications are made as required for the individual tests.

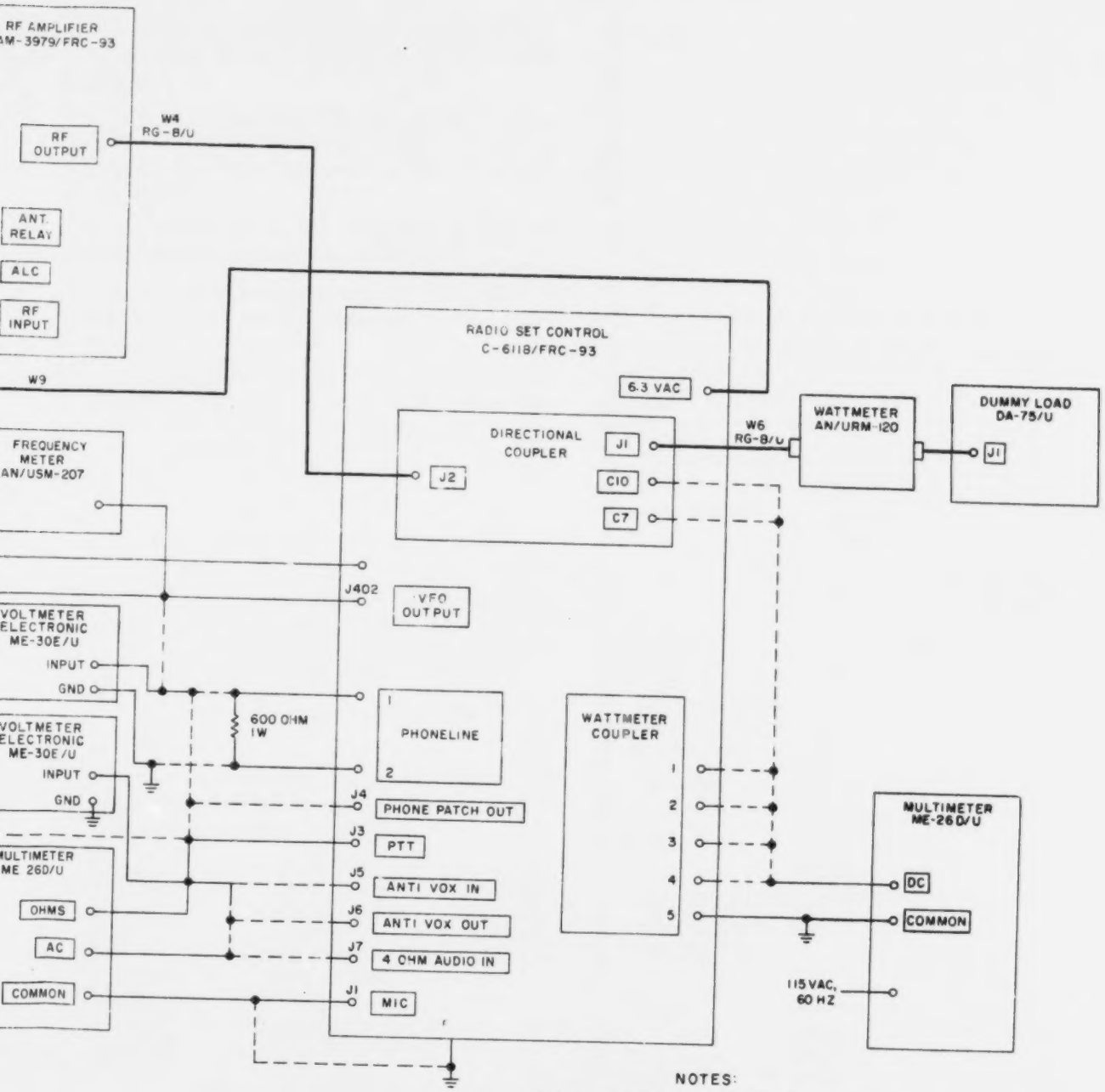
*a.* Connect the test equipment as shown in figure 12 and as indicated in the following procedures:

*b.* Initially set two-tone generator controls as follows:

| Control | Setting |
|---|---|
| FREQUENCY A | 100 Hz |
| FREQUENCY B | 100 Hz |
| MULTIPLIER A | X1 |
| MULTIPLIER B | X1 |
| LEVEL A | Minimum |
| LEVEL B | Minimum |
| OUTPUT | A |
| UNIT VERNIER A | Minimum |
| UNIT VERNIER B | Minimum |
| POWER | ON |
| OUTPUT LEVEL DB BELOW METER READING. | For suitable modulation level of transmitter. |

*c.* Connect the transceiver ANT. RELAY and ALC jacks on to ANT. RELAY, and the


SPECTRUM ANALYZER AN/URM-134A
TWO TONE GENERATOR TTG-2
OUTPUT
AB
B
A
W7
115 VAC, 60 HZ
POWER
TRANSCEIVER RT-718/FRC-93
ANT. RELAY
W1 CPN 426-2027-00
ALC
W2 CPN 426-2027-00
PHONE PATCH
RF OUT
W3 RG-58C/U CPN 426-3079-00
6.3 VAC
PTT
MIC
115 VAC, 60 HZ
J17
J18
POWER SUPPLY PP-4151/FRC-93
115 VAC, 60 HZ
POWER




NOTES:

1. DASHED LINES INDICATE ALTERNATE TEST EQUIPMENT CONNECTIONS. SEE TEXT.
2. W1 AND W2 - CPN 426-2027-00; W3-RG-58C/U, CPN 426-5067-00; W4, W5 AND W6 - RG-8/U WITH CORRECT CONNECTOR, W7, W8 AND W9 - TO BE FABRICATED, SEE TEXT.
3. ▭ INDICATES EQUIPMENT MARKING.

TM5820-530-15-C3-1

*Figure 12. Radio Set Control C-6118/FRC-93, test setup.*

RF amplifier ALC jacks with test cables W1 and W2.

*d.* Connect the transceiver RF OUT jack to RF amplifier RF INPUT jack with test cable W3.

*e.* Connect the PP–4151/FRC–93 11-pin power plug to the transceiver POWER connector.

*f.* Connect the amplifier RF OUTPUT connector to J2 on directional coupler (mounted at the rear of the radio set control) with test cable W4.

*g.* Connect J1 on the directional coupler to J1 on dummy load with test cable W6.

*h.* Connect the transceiver 6.3 VAC jack to 6.3 VAC jack on the radio set control with test cable W9.

*i.* Connect the power input plugs on the amplifier, the power supply, the two-tone generator, the multimeter, the frequency meter, and the electronic voltmeter to a 115-volt alternating current (ac) power source.

### 6.5. Push-to-Talk (PTT) Circuit Continuity Tests

*a.* Connect the multimeter OHMS test lead to the radio set control PTT jack, and the multimeter COMMON test lead to the tip of MIC input jack J1 on the radio set control.

*b.* Set the multimeter SELECTOR switch to OHMS.

*c.* Set the switches as shown below and check to see that correct multimeter indications are obtained.

| *PHONE PATCH switch* | *FUNCTION switch* | *Multimeter* |
|---|---|---|
| ON | NORMAL | Continuity |
| OFF | NORMAL | Continuity |
| ON | RECEIVE ONLY | Open |
| OFF | RECEIVE ONLY | Open |
| STATION MUTE. | NORMAL | Open |
| STATION MUTE. | RECEIVE ONLY | Open |

*d.* Remove the multimeter COMMON test lead from the tip of MIC input jack J1 on the radio set control. Connect the multimeter COMMON test lead to the radio set control chassis ground.

*e.* Set the switches as shown below and check to see that correct multimeter indications are obtained.

| *PHONE PATCH switch* | *FUNCTION switch* | *Multimeter* |
|---|---|---|
| ON | NORMAL | Open |
| ON | RECEIVE ONLY | Open |
| ON | TRANSMIT ONLY. | Continuity |
| OFF | NORMAL | Open |
| OFF | RECEIVE ONLY | Open |
| OFF | TRANSMIT ONLY. | Continuity |
| STATION MUTE. | All positions | Open |

### 6.6. Transmitter Audio Out Continuity Tests

*a.* Connect the multimeter OHMS test lead to PHONE PATCH OUT jack J4, and the COMMON test lead to the ring on MIC input jack J1 on the radio set control.

*b.* Set the switches as shown below and check to see that correct multimeter indications are obtained.

| *PHONE PATCH switch* | *Multimeter* |
|---|---|
| ON | Open |
| OFF | Continuity |

*c.* Remove the multimeter COMMON test lead from the ring on MIC input jack J1 on the radio set control. Connect the multimeter COMMON test lead to the radio set control chassis ground.

*d.* Set the switches as shown below and check that correct multimeter indications are obtained.

**NOTE**

Connect PHONE PATCH OUT jack (J4) shield to ground while performing this test.

| *PHONE PATCH switch* | *FUNCTION switch* | *Multimeter* |
|---|---|---|
| ON | NORMAL | Continuity |
| OFF | NORMAL | Open |
| STATION MUTE. | NORMAL | Continuity |
| OFF | RECEIVE ONLY | Continuity |
| OFF | TRANSMIT ONLY. | Open |

### 6.7. Speaker Tests

*a.* Connect the two-tone generator OUTPUT jack to 4 OHM AUDIO IN jack J7 on the radio set control.

*b.* Set the radio set control FUNCTION switch to NORMAL and the PHONE PATCH switch to OFF.

*c.* Adjust the two-tone generator LEVEL control for a comfortable volume. Sweep the two-tone generator FREQUENCY controls through the audible frequency range; check to see that the speaker is free from noise and vibration.

*d.* Set the PHONE PATCH switch to ON. Speaker shall shut off.

*e.* Set the PHONE PATCH switch to OFF, and the FUNCTION switch to NORMAL and RECEIVE ONLY. Speaker shall come on.

*f.* Set the FUNCTION switch to TRANSMIT ONLY. Speaker shall be shut off regardless of PHONE PATCH switch setting.

### 6.8. Receiver Output Tests

*a.* Connect a 600-ohm, 1-watt resistor across the PHONE LINE input terminals (1) and (2) on the radio set control.

*b.* Set the FUNCTION switch to NORMAL and the PHONE PATCH switch to ON.

*c.* Connect the electronic voltmeter INPUT ac probe and the two-tone generator OUTPUT jack to ANTI–VOX IN jack J5 on radio set control.

*d.* Connect the second electronic voltmeter INPUT ac probe to PHONE PATCH OUT jack J4 on the radio set control.

*e.* Adjust the two-tone generator controls for a +20 DBM signal at 1 kilohertz (kHz) at ANTI–VOX IN jack J5 on the radio set control.

*f.* Adjust VOX BAL. control R10 for a minimum output at PHONE PATCH OUT jack J4.

*g.* Measure the signal level output at PHONE PATCH OUT jack (J4) at the frequencies shown below.

| *Frequency (Hz)* | *Output signal level* |
|---|---|
| 200 | NMT −30 dBm |
| 1000 | NMT −35 dBm |
| 3500 | NMT −35 dBm |

*h.* Set the PHONE PATCH switch to OFF and STATION MUTE. No output signal shall appear with the PHONE PATCH switch set to these settings.

*i.* Disconnect the electronic voltmeter from PHONE PATCH OUT jack J4 and connect it across PHONE LINE terminals (1) and (2) on the radio set control.

*j.* Set the FUNCTION switch to NORMAL and the PHONE PATCH switch to ON.

*k.* Disconnect the electronic voltmeter INPUT ac test lead and the two-tone generator connected to ANTI–VOX IN jack J5 in *e* above, and connect the electronic voltmeter INPUT ac test lead and the two-tone generator OUTPUT jack to ANTI–VOX OUT jack J6 on the radio set control.

*l.* Adjust the two-tone generator controls for a +20-dBm signal at ANTI–VOX OUT jack J6.

*m.* Connect the electronic voltmeter to PHONE LINE terminals (1) and (2) and measure the signal level output at the frequencies shown below.

| *Frequency (Hz)* | *Output signal level* |
|---|---|
| 200 | Within ±2.5 dB of 1-kHz signal level |
| 1,000 | −7 dBm ±2 dB |
| 3,500 | Within ±2 dB of 1-kHz signal level |
| 10,000 | Within ±2 dB of 1-kHz signal level |

*n.* Set the PHONE PATCH switch to OFF and STATION MUTE. No output signal shall appear with the PHONE PATCH switch set to these positions.

### 6.9. Telephone Line to Transmitter Tests

*a.* Connect the electronic voltmeter ac test lead and the two-tone generator OUTPUT jack across PHONE LINE terminals (1) and (2) on the radio set control.

*b.* Connect the electronic voltmeter INPUT ac test lead to PHONE PATCH OUT jack J4 on the radio set control.

*c.* Set the PHONE PATCH switch to ON and the FUNCTION switch to NORMAL.

*d.* Adjust the two-tone generator controls for a −10-dBm signal at PHONE LINE terminals (1) and (2).

*e.* Measure the signal level output at PHONE PATCH OUT jack J4 at the frequencies shown below.

| *Frequency (Hz)* | *Output signal level* |
|---|---|
| 200 | Within 5.5 dB of 1-kHz level |
| 1,000 | −23 dB ±2 dB |
| 3,500 | Within 2 dB of 1-kHz level |

*f.* Set the PHONE PATCH switch to OFF and STATION MUTE. No output signal shall appear with the PHONE PATCH switch set to these positions.

### 6.10. Wattmeter Test

*a.* Connect the equipment as outlined in paragraph 6.4 and as shown in figure 12.

*b.* Refer to figures 2, 8, and 9; remove the directional coupler by removing the screws that attach the directional coupler to the radio set control case. Remove the cover from the directional coupler by removing the screws that fasten the cover to the directional coupler.

*c.* Remove the connection from C10 on the directional coupler and connect multimeter ME–26D/U between C10(+) and terminal 5 (−) on WATTMETER COUPLER terminal board on the radio set control.

*d.* Set up the amplifier and the transceiver on 29.5 MegaHertz (MHz) as outlined in TM 11–5820–532–15.

*e.* Set the transceiver PLATE GRID ALC switch to ALC.

*f.* Set the dummy load REMOTE SWITCH-DUMMY LOAD switch to DUMMY LOAD.

*g.* Set the two-tone generator output A to provide a 1.0-kHz signal, and output B to provide a 1.9-kHz signal. Monitor the two-tone generator outputs on the multimeter; adjust the two-tone generator controls as necessary so that the level of both audiofrequency (af) output signals are set to 0 volt.

**CAUTION**

**Do not apply a radiofrequency (rf) output to the dummy load for more than 30 seconds at a time. To stop transmitting, remove ground from PTT jack.**

*h.* Ground PTT jack.

*i.* Set the two-tone generator LEVEL controls to obtain a 6-dB ALC indication on the transceiver meter. Monitor the two-tone generator outputs on the multimeter to insure that the level of both signals is equal.

*j.* Adjust trimmer C2 on the directional coupler for a minimum indication on Multimeter ME–26D/U.

*k.* Remove ground from PTT jack.

*l.* Reverse connections made in paragraph 6.4*f* and *g*.

*m.* Remove connection from C7 on directional coupler and connect Multimeter ME–26D/U (+) to C7. Reconnect the wire removed in *c* above to C10.

*n.* Ground PTT jack.

*o.* Adjust trimmer C1 on the directional coupler for a minimum indication on Multimeter ME–26D/U.

*p.* Remove ground from PTT jack.

*q.* Disconnect Multimeter ME–26D/U from C7 on the directional coupler and replace wire disconnected in *m* above.

*r.* Repeat procedures given in paragraph 6.4*f* and *g* and remove Multimeter ME–26D/U (−) connection made in *c* above.

*s.* Install the cover on the directional coupler by replacing the screws that attach the directional coupler to the radio set control case.

*t.* Set up the amplifier and transceiver on 14.0 MHz as outlined in TM 11–5820–532–15.

*u.* Set the radio set control WATTMETER switch to FORWARD 200.

*v.* Connect Multimeter ME–26D/U as shown in figure 12.

*w.* Repeat procedures in *g* and *h* above.

*x.* Set the two-tone generator LEVEL controls to obtain a 160-watt indication on Wattmeter AN/URM–120. Monitor the two-tone generator outputs on the multimeter to insure that the level of both signals is equal.

*y.* Radio set control WATTMETER M1 shall indicate 160 ±16 watts.

*z.* Remove ground from PTT jack.

*aa.* Connect Multimeter ME–26D/U between terminals (2) (+) and (5) (−) on the WATTMETER COUPLER terminal board.

*ab.* Set the radio set control WATTMETER switch to FORWARD 2000.

*ac.* Ground PTT jack.

*ad.* Set the two-tone generator LEVEL controls to obtain a 500-watt indication on Wattmeter AN/URM–120. Monitor the two-tone generator outputs on the multimeter to insure that the level of both signals is equal.

*ae.* The radio set control WATTMETER M1 shall indicate 500 ±50 watts.

*af.* Remove ground from PTT jack.

*ag.* Set the radio set control WATTMETER switch to REFLECTED 200.

*ah.* Connect Multimeter ME–26D/U between terminals (4) (+) and (5) (−) on the WATTMETER COUPLER terminal board.

*ai.* Reverse connections made in paragraph 6.4*f* and *g*.

*aj.* Repeat procedures given in *u* through *z* above.

*ak.* Set the radio set control WATTMETER switch to REVERSE 2000.

*al.* Connect Multimeter ME–26D/U between terminals (3) (+) and (5) (−) on the WATTMETER COUPLER terminal board.

*am.* Repeat the procedures given in *h* above.

*an.* Repeat the procedures in paragraph 6.4*f* and *g* and disconnect Wattmeter AN/URM–120 from the WATTMETER COUPLER terminal board.

### 6.11. 70K–2 VFO Tests

NOTE

If the variable frequency oscillator is correctly set up, proceed directly to *b* below.

*a.* Refer to figure 12 for the test setup and to figure 11 for the schematic diagram. Adjust the variable frequency oscillator by following the procedures listed below.

(1) Tune the oscillator for an indication of 2.6 MHz on the AN/USM–207.

(2) Switch from +130 to 30 volts direct current (dc) (KWM–2 emission switch to LSB) applied to the diode switch lead and observe the frequency change.

(3) Repeat adjustment of C308 successively until the frequency change ((2) above) with +130 volts dc applied is 2,700 ±10 hertz (Hz).

(4) The C308 adjustment ((3) above) is correct if—

(*a*) The frequency change ((2) above) measured at 2.5 MHz does not exceed ±100 Hz of 2.6-MHz value.

(*b*) The frequency change ((2) above) measured at 2.7 MHz does not exceed ±100 Hz of 2.6-MHz value.

(5) Adjust the tuning core of T301 for a maximum output indication on the ME–26D/U connected to the oscillator output.

(6) Tune the oscillator for a 2.5-MHz indication on the frequency meter.

(7) Rotate the tuning shaft 2 turns counterclockwise. Note the frequency difference from 2.7 MHz.

(8) Correct the frequency error noted in (6) above by tuning trimmer L302.

(9) Rotate the tuning shaft 2 turns clockwise. Note the frequency difference from 2.5 MHz.

(10) Repeat the procedures in (7), (8), and (9) above until tuning from 2.5 to 2.7 MHz is accomplished in exactly 2 turns.

(11) Adjust the end stops to provide approximately equal increments of overtravel at each end of the frequency range.

*b.* The following procedures provide tests of the variable frequency oscillator (fig. 11 and 12).

(1) Tune the oscillator for a 2.6-MHz indication on the frequency meter.

(2) Vary B+ voltage from 0 to rated voltage value. Record voltage at which oscillation starts.

(3) Set B+ voltage to rated voltage value. Be sure that all power voltages are at normal settings.

(4) Attach a 100-ohm, 1-watt resistor across the rf output. Use the electronic voltmeter to measure the rf output (measure at 2.5, 2.6, and 2.7 MHz) across the 100-ohm resistor. Record the voltage measured at each frequency, the voltage shall be not less than 1.0 volt ac.

(5) Measure the output in decibels (dB) at 2.5 and 2.7 MHz. Record the variations from the value measured at 2.6 MHz. Output variations should not exceed 6 dB from value measured at 2.6 MHz.

## 6.12. Directional Coupler Tests

**NOTE**

Any directional coupler not meeting the limits specified in the following procedures must be recalibrated. Refer to paragraph 6.13.

*a.* Connect the test equipment as shown in figure 13.

*b.* Set radio set control switch S3 to FORWARD 200.

*c.* Tune and load the transceiver and the amplifier at 14 MHz for a 100-watt indication on Wattmeter AN/URM–120. Set switch S3 to FORWARD 200. Meter indication should be 100 ±10 watts.

*d.* Increase the amplifier rf output to 200 watts.

*e.* Check the indication on Wattmeter AN/URM–120. Set switch S3 to FORWARD 200. Meter indication should be 200 ±20 watts.

*f.* Set radio set control switch S3 to FORWARD 2000.

*g.* Increase the amplifier rf output to 500 watts.

*h.* Check the indication on Wattmeter AN/URM–120. Set switch S3 to FORWARD 2000. Meter indication should be 500 ±50 watts.

*i.* Return the amplifier rf output to 0.

*j.* Tune and load the transceiver and the amplifier at 3.4 MHz for a 100-watt indication on Wattmeter AN/URM–120. Set switch S3 to FORWARD 200. Meter indication should be 100 ±10 watts.

*k.* Return the amplifier rf output to 0.

*l.* Tune and load the transceiver and the amplifier at 29.5 MHz for a 100-watt indication on AN/URM–120. Set switch S3 to FORWARD 200. Meter indication should be 100 ±10 watts.

*m.* Return the amplifier rf output to 0.

*n.* Connect J1 to the rf load, and J2 to the amplifier rf output.

*o.* Set radio set control switch S3 to REFLECTED 200.

*p.* Tune and load the transceiver and the amplifier at 14 MHz for a 100-watt indication on AN/URM–120. Set switch S3 to REFLECTED 200. Meter indication should be 100 ±10 watts.

*q.* Increase the amplifier rf output to 200 watts.

*r.* Check the indication on AN/URM–120. Set switch S3 to REFLECTED 200. Meter indication should be 200 ±20 watts.

*s.* Set radio set control switch S3 to REFLECTED 2000.

*t.* Increase the amplifier rf output to 500 watts.

*u.* Check the indication on AN/URM–120. Set switch S3 to REFLECTED 2000. Meter indication should be 500 ±50 watts.

*v.* Return the amplifier rf output to 0.

*w.* Tune and load the transceiver and amplifier at 3.4 MHz for a 100-watt indication on AN/URM–120. Set switch S3 to REFLECTED 200. Meter indication should be 100 ±10 watts.

*x.* Return the amplifier rf output to 0.

*y.* Tune and load the transceiver and the amplifier at 29.5 MHz for a 100-watt indication on AN/URM–120. Set switch S3 to REFLECTED 200. Meter indication should be 100 ±10 watts.

*z.* Return the amplifier rf output to 0. Disconnect all test connections.

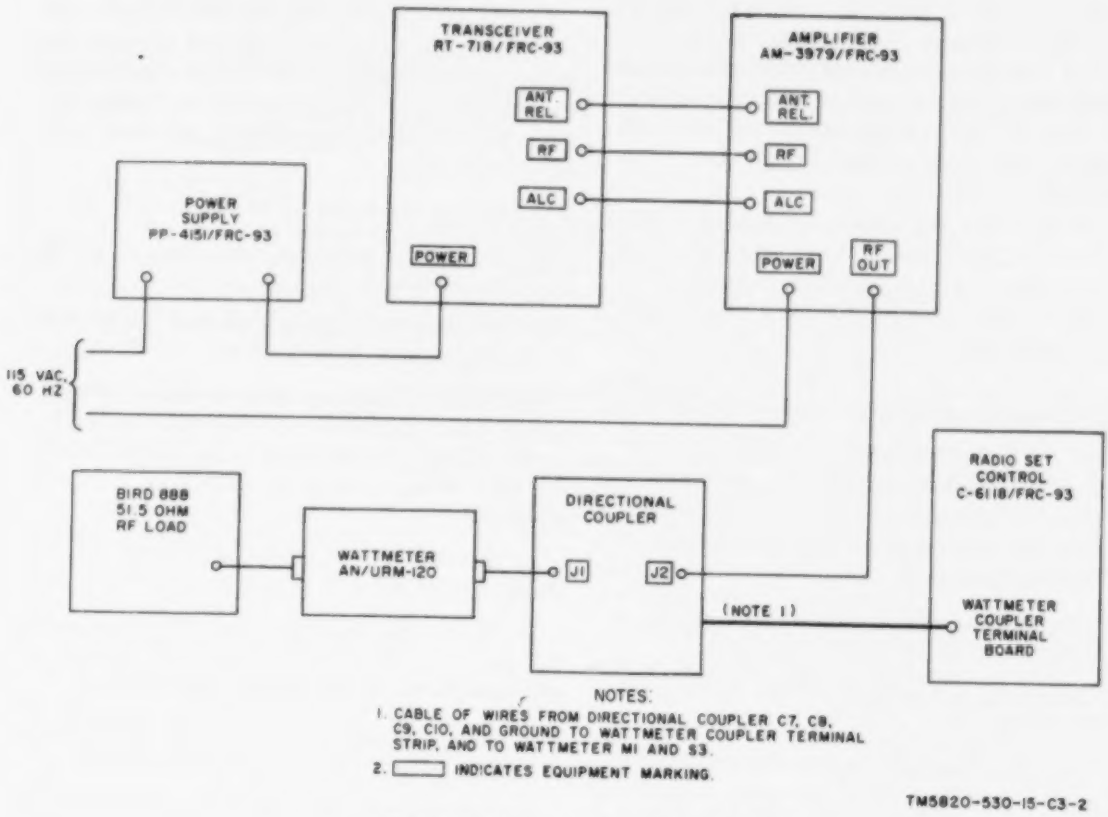



*Figure 13. Directional coupler test setup.*

## 6.13. Directional Coupler Calibration Procedures

The directional coupler calibration procedures will be performed under the conditions listed below and as shown in figure 13.

**CAUTION**

Use a 25-watt soldering iron and a heat sink when installing or removing components.

**NOTE**

Physically remove the directional coupler from the radio set control with WATTMETER M1 cabling remaining connected, as described in paragraph 6.10*b*. Remove the directional coupler cover.

**NOTE**

Disconnect directional coupler resistors R3, R4, R5, and R6 from the directional coupler circuit (fig. 9). Diodes CR1 and CR2 must be a matched pair. A typical ratio for diodes is 50K:1.5K. The diode with a greater inverse ratio should be placed in the forward direction. The standing wave ratio (swr) should not exceed 10 percent for normal operation.

*a.* Connect the test equipment as shown in figure 13.

*b.* Connect a jumper wire in place of R6 to set the resistance to 0 ohm.

*c.* Tune and load the transceiver and the amplifier to full rf output at 29.5 MHz. Set

radio set control switch S3 to REFLECTED 200.

*d.* Adjust C2 (fig. 8) for a null on WATTMETER M1. Return the rf output to 0.

*e.* Connect J1 to rf load and J2 to amplifier rf output.

*f.* Connect a jumper wire in place of R5 to set the resistance to 0 ohm.

*g.* Apply maximum rf output at 29.5 MHz. Set radio set control switch S3 to FORWARD 200.

*h.* Adjust C1 (fig. 8) for null on WATTMETER M1. Return rf output to 0.

*i.* Connect J2 to amplifier output and J1 to rf load.

*j.* Be sure radio set control switch S3 is set to FORWARD 200.

*k.* Tune and load the transceiver and amplifier at 14 MHz for 100-watt indication on AN/URM–120.

*l.* Disconnect jumper wire and select resistor value from column 2, table 4, using loose resistors. Wattmeter will indicate 100 watts.

*m.* Return rf output to 0.

*n.* Connect J1 to amplifier output and J2 to rf load.

*o.* Set radio set control switch S3 to REFLECTED 200.

*p.* Connect a jumper wire in place of R6 to set the resistance to 0 ohm (fig. 9).

*q.* Increase rf output to 100-watt indication on AN/URM–120.

*r.* Disconnect the jumper wire and select resistor value from column 2, table 4, using loose resistors. Wattmeter will indicate 100 watts.

*s.* Return rf output to 0. Note that resistance values selected in steps *l* and *r* above comply with resistor values listed in table 4.

*t.* If resistance values for steps *l* and *r* above exceed stated limits, CR1 and CR2 must be rematched (para 6.10*b*) and steps *a* through *s* above repeated.

*u.* Disconnect the jumper wires and install resistors of the values selected for R5 and R6.

**CAUTION**

Use a 25-watt soldering iron and heat sink when installing components.

*v.* Reconnect test equipment as shown in figure 13.

*w.* Connect a jumper wire in place of R3 to set the resistance to 0 ohm.

*x.* Set radio set control switch S3 to FORWARD 2000.

*y.* Tune and load the transceiver and amplifier at 14 MHz for a 500-watt indication on the AN/URM–120.

*z.* Disconnect jumper wire and select a resistor value from column 1, table 4, using loose resistors. Wattmeter will indicate 500 watts.

*aa.* Return rf output to 0.

*ab.* Connect J1 to amplifier rf output and J2 to rf load.

*ac.* Connect a jumper wire in place of R4 to set the resistance to 0 ohm (fig. 9).

*ad.* Set radio set control switch S3 to REFLECTED 2000.

*ae.* Tune and load the transceiver and amplifier at 14 MHz for a 500-watt indication on the AN/URM–120.

*af.* Disconnect jumper wires and select a resistor value from column 1, table 4, using loose resistors. Wattmeter will indicate 500 watts.

*ag.* Return the rf output to 0 and disconnect the jumper wires. Install resistors of values selected for R3 and R4.

**CAUTION**

Use a 25-watt soldering iron and a heat sink when installing components.

*ah.* After calibration, the directional coupler must be tested. Refer to paragraph 6.12.

*Table 4. Directional Coupler Resistor Values*

| *Resistors R3 and R4 (ohms)* | *Resistors R5 and R6 (ohms)* |
|---|---|
| 5,360 | 1,000 |
| 5,620 | 1,050 |
| 5,900 | 1,100 |
| 6,190 | 1,150 |
| 6,490 | 1,210 |
| 6,810 | 1,270 |
| 7,150 | 1,330 |
| 7,500 | 1,400 |
| 7,870 | 1,470 |
| 8,250 | 1,540 |
| 8,660 | 1,620 |
| 9,090 | 1,690 |
| 9,530 | 1,760 |
| 10,000 | 1,870 |
| 10,500 | 1,960 |
| 11,000 | 2,050 |
| 11,500 | 2,150 |
| 12,100 | 2,260 |
| | 2,370 |
| | 2,490 |

*Page 18*, appendix I. Delete the appendix and substitute:

## APPENDIX A

## REFERENCES

| | |
|---|---|
| DA Pam 310–4 | Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders. |
| DA Pam 310–7 | U.S. Army Equipment Index of Modification Work Orders. |
| SB 11–573 | Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment. |
| TB 746–10 | Field Instructions for Painting and Preserving Electronics Command Equipment. |
| TB SIG 291 | Safety Measures to be Observed When Installing and Using Whip Antennas, Field Type Masts, Towers, Antennas, and Metal Poles that are Used with Communication, Radar, and Direction Finder Equipment. |
| TB SIG 355–1 | Depot Inspection Standard for Repaired Signal Equipment. |
| TB SIG 355–2 | Depot Inspection Standard for Refinishing Repaired Signal Equipment. |
| TB SIG 355–3 | Depot Inspection Standard for Moisture and Fungus Resistant Treatment. |
| TM 11–5820–529–15 | Organizational, DS, GS, and Depot Maintenance Manual: Transceiver RT–718/FRC–93 (Collins Model KWM–2 and KWM–2A), and Power Supply PP–3990/FRC–93 (Collins Model PM–2), Power Supply PP–4151/FRC–93 (Collins Model 516F–2), and Crystal Unit Set Quartz CK–31/FRC (Collins Crystal Packet CP–1) Including Repair Parts and Special Tool Lists, and Installation and Operating Instructions for Waters, Q-Multiplier/Notch Filter, Model 340–A. |
| TM 11–5820–532–15 | Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tools Lists: Amplifier, RF AM–3979/FRC–93 (Collins Model 30L–1). |
| TM 11–5820–554–15 | Organizational, DS, GS, and Depot Maintenance Manual: Radio Set AN/FRC–93, Including Repair Parts and Special Tool Lists. |
| TM 11–6625–200–15 | Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeters ME–26A/U, ME–26B/U, ME–26C/U, and ME–26D/U. |
| TM 11–6625–320–12 | Operator and Organizational Maintenance Manual: Voltmeter, Meter ME–30A/U and Voltmeters, Electronic ME–30B/U, ME–30C/U, and ME–30E/U. |
| TM 11–6625–446–15 | Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Wattmeter AN/URM–120. |
| TM 11–6625–700–10 | Operator's Manual: Digital Readout, Electronic Counter AN/USM–207. |
| TM 38–750 | The Army Maintenance Management System (TAMMS). |

Add appendix B after appendix A.

# APPENDIX B

# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### B–1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

### B–2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

*a. Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

*b. Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

*c. Service.* To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

*d. Adjust.* To rectify to the extent necessary to bring into proper operating range.

*e. Align.* To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

*f. Calibrate.* To determine the corrections to be made in the readings of instruments or test equipment use in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

*g. Install.* To set up for use in an operational environment such as an encampment, site, or vehicle.

*h. Replace.* To replace unserviceable items with serviceable like items.

*i. Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

*j. Overhaul.* Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

*k. Rebuild.* The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other para-

mount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

*l. Symbols.* The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

### B–3. Explanation of Format

*a. Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

*b. Column 2, Functional Group.* Column 2 lists the noun names of components, assemblies, subassemblies and modules on which maintenance is authorized.

*c. Column 3, Maintenance Functions.* Column 3 lists the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

| *Code* | *Maintenance category* |
|---|---|
| C | Operator/crew |
| O | Organizational maintenance |
| F | Direct support maintenance |
| H | General support maintenance |
| D | Depot maintenance |

*d. Column 4, Tools and Test Equipment.* Column 4 specifies, by code, those tools and test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in table I.

*e. Column 5, Remarks.* Self-explanatory.

### B–4. Explanation of Format of Table I, Tool and Test Equipment Requirements

The columns in table I are as follows:

*a. Tools and Equipment.* The numbers in this column coincide with the numbers used in the tools and equipment column of the Maintenance Allocation Chart. The numbers indicate the applicable tool for the maintenance function.

*b. Maintenance Category.* The codes in this column indicate the maintenance category normally allocated the facility.

*c. Nomenclature.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

*d. Federal Stock Number.* This column lists the Federal stock number of the specific tool or test equipment.

*e. Tool Number.* Not used.

SECTION II. MAINTENANCE ALLOCATION CHART (C-6118/FRC-93)

| GROUP NUMBER | COMPONENT ASSEMBLY NOMENCLATURE | MAINTENANCE FUNCTIONS | | | | | | | | | | | TOOLS AND EQUIPMENT | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INSPECT | TEST | SERVICE | ADJUST | ALIGN | CALIBRATE | INSTALL | REPLACE | REPAIR | OVERHAUL | REBUILD | | |
| 1 | CONTROL, RADIO SET C-6118/FRC-93 | C | | C | | | | | | | | | | |
| | | | O | | | | | | | | | | 2,5 | |
| | | | F | | | | | | | | | | 3,4,6 | Locate discrepant parts. |
| | | | | | | | | | | O | | | 2,5 | |
| | | | | | | | | | | F | | | 3,4,6 | Replace faulty parts. |
| | | | | | | | | | | | D | | 1,3,4,6 thru 13 | |

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS (C-6118/FRC-93)

| TOOLS AND EQUIPMENT | MAINTENANCE CATEGORY | NOMENCLATURE | FEDERAL STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | H,D | FREQUENCY METER AN/USM-207 | 6625-911-6368 | |
| 2 | O | MULTIMETER AN/URM-105( ) | 6625-581-2036 | |
| 3 | F,H,D | MULTIMETER TS-352B/U | 6625-553-0142 | |
| 4 | F,H,D | MULTIMETER ME-26D/U | 6625-913-9781 | |
| 5 | O | TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G | 5180-084-5178 | |
| 6 | F,H,D | TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G | 5180-610-8177 | |
| 7 | F,H,D | WATTMETER AN/URM-120 | 6625-813-8430 | |
| 8 | F,H,D | TRANSCEIVER RT-718/FRC-93 | 5820-082-4276 | |
| 9 | F,H,D | POWER SUPPLY PP-4151/FRC-93 | 5820-985-8099 | |
| 10 | F,H,D | VOLTMETER, ELECTRONIC ME-30E/U | 6625-643-1670 | |
| 11 | F,E,D | AMPLIFIER, RF AM-3979/FRC-93 | 5820-082-4081 | |
| 12 | F,H,D | TEST SET, RADIO AN/URM-134A | 6625-474-0359 | |
| 13 | F,H,D | DUMMY LOAD, ELECTRICAL DA-75/U | 5985-280-3480 | |

SECTION III. MAINTENANCE ALLOCATION CHART (C-7515/FRC-93)

| GROUP NUMBER | COMPONENT ASSEMBLY NOMENCLATURE | MAINTENANCE FUNCTIONS | | | | | | | | | | | TOOLS AND EQUIPMENT | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INSPECT | TEST | SERVICE | ADJUST | ALIGN | CALIBRATE | INSTALL | REPLACE | REPAIR | OVERHAUL | REBUILD | | |
| 1 | CONTROL, RADIO SET C-7515/FRC-93 | C | | C | | | | | | | | | | |
| | | | O | | | | | | | | | | 2,7 | |
| | | | F | | | | | | | | | | 3,4,6,8 | Locate discrepancy of parts. |
| | | | | | | | | | | O | | | 2,10 | |
| | | | | | | | | | | F | | | 3,4,6,8 | Replace faulty parts. |
| | | | | | | | | | | | D | | 1,3,4,5, 8 thru 15 | |
| 1A | DIRECTIONAL COUPLER | | | | | | | | F | | | | 8 | |
| | | | H | | | | | | | | | | 8 thru 11, 13,16,17 | |
| | | | | | | | H | | | | | | 8 thru 11, 13,16,17 | |
| | | | | | | | | | | H | | | 8 thru 11, 13,16,17 | |
| | | | | | | | | | | | D | | 8 thru 11, 13,16,17 | |
| 1B | VARIABLE FREQUENCY OSCILLATOR, 70 K2 | | | | | | | | F | | | | 3,6,8 | |
| | | | | | | | | | | | D | | | Return item to Collins Radio Co, Cedar Rapids, Iowa, 52406, for repair. |

TABLE II. TOOL AND TEST EQUIPMENT REQUIREMENTS (C-7515/FRC-93)

| TOOLS AND EQUIPMENT | MAINTENANCE CATEGORY | NOMENCLATURE | FEDERAL STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | H,D | FREQUENCY METER AN/USM-207 | 6625-911-6368 | |
| 2 | O | MULTIMETER AN/URM-105( ) | 6625-581-2036 | |
| 3 | F,H,D | MULTIMETER TS-352 B/U | 6625-553-0142 | |
| 4 | F,H,D | MULTIMETER ME-26D/U | 6625-913-9781 | |
| 5 | H,D | TEST SET, ELECTRON TUBE TV-2C/U | 6625-849-5694 | |
| 6 | F,H | TEST SET, ELECTRON TUBE TV-7D/U | 6625-820-0064 | |
| 7 | O | TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G | 5180-064-5178 | |
| 8 | F,H,D | TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G | 5180-610-8177 | |
| 9 | F,H,D | WATTMETER AN/URM-120 | 6625-813-8430 | |
| 10 | F,H,D | TRANSCEIVER RT-718/FRC-93 | 5820-082-4276 | |
| 11 | F,H,D | POWER SUPPLY PP-4151/FRC-93 | 5820-985-8099 | |
| 12 | F,H,D | VOLTMETER, ELECTRONIC ME-30E/U | 6625-643-1670 | |
| 13 | F,H,D | AMPLIFIER, RF AM-3979/FRC-93 | 5820-082-4081 | |
| 14 | F,H,D | TEST SET, RADIO AN/URM-134A | 6625-474-0359 | |
| 15 | F,H,D | DUMMY LOAD, ELECTRICAL DA-75/U | 5985-280-3480 | |
| 16 | F,H,D | CONTROL, RADIO SET C-6118/FRC-93 | 5820-082-4082 | |
| 17 | F,H,D | RF LOAD, 51.5 OHM BIRD 888 | | |

*Page 19.* Change paragraph designation 6.1 to 7.1.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
*General, United States Army*
*Chief of Staff*

Official:

VERNE L. BOWERS
*Major General, United States Army*
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12–50 (qty rqr block No. 185) operator maintenance requirements for AN/FRC–93.

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## A.1 SCOPE.

This manual describes Control, Radio Set C-6118/FRC-93, and contains instructions for its installation, operation, and maintenance. This is a first-edition manual containing preliminary and unreviewed information compiled by the manufacturer of the equipment. Judicious caution should be exercised in using the information in this manual until it is replaced by a revised edition.

Note: Paragraphs 5.2 through 5.8 have been added to provide preventive maintenance instructions.

## A.2 INDEX OF PUBLICATIONS.

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. Department of the Army Pamphlet No. 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 4, 6, 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes to and revisions of each equipment publication.

## A.3 FORMS AND RECORDS.

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting, by the individual user, of errors, omissions, and recommendations for improving this equipment manual is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form will be completed by the use of pencil, pen, or typewriter. DA Form 2028 will be completed in triplicate and forwarded by the individual using the manual. The original and one copy will be forwarded direct to: Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-MP-P, Fort Monmouth, New Jersey 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc).

# 312B-4 and 312B-5 Station Controls

COLLINS

instruction book

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

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Printed in U.S.A.

523-0179000-004311

4th Edition, 1 September 1963

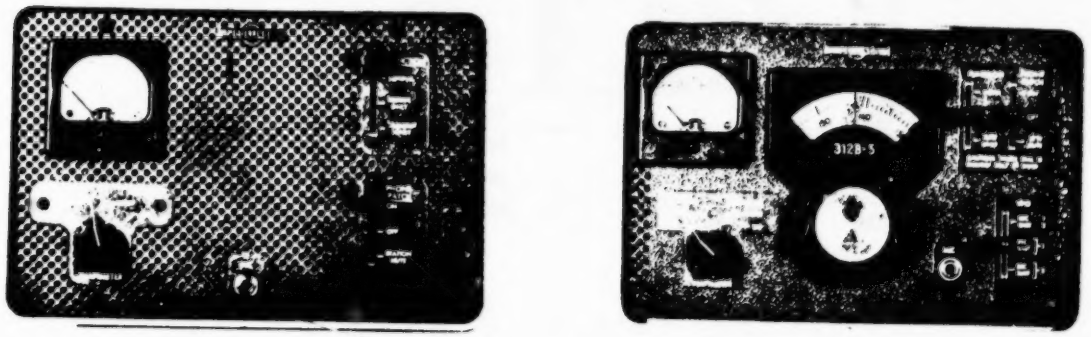



Figure 1. 312B-4 and 312B-5 Station Controls, Front Panel View, Operating Controls

C569-09-2P

**1.1 DESCRIPTION.**

The 312B-4 and 312B-5 Station Controls, see figure 1, contain a directional coupler and wattmeter, a pm speaker, a phone patch, and appropriate switching circuitry. The same types of directional coupler and wattmeter, phone patch, and speaker are used in both the 312B-4 and 312B-5. In addition, the 312B-5 contains a variable frequency oscillator to provide separate transmit and receive frequencies when used with the KWM-2 or KWM-2A Transceivers.

The wattmeter indicates power levels within the ranges of 0 to 200 or 0 to 2000 watts, forward or reflected.

TABLE 1. ITEMS FURNISHED WITH 312B-4 AND 312B-5

| QUANTITY | DESCRIPTION | FUNCTION | PART NUMBER |
|---|---|---|---|
| 1 | Right-angle connector, r-f type N | Antenna connection | 357-9113-00 |
| 1 | RG-58C/U cable with phono and N-connectors | Connect transmitter to coupler | 426-6026-00 |
| 5 | Audio cables with phono connectors | Interconnections | 426-2027-00 |
| 1 | Tubular capacitor, 0.5 uf, 200 volts d-c | Install in phone patch if required | 931-0169-00 |
| 1 (312B-5 only) | RG-58C/U cable with phono connectors | External vfo connection | 426-5076-00 |

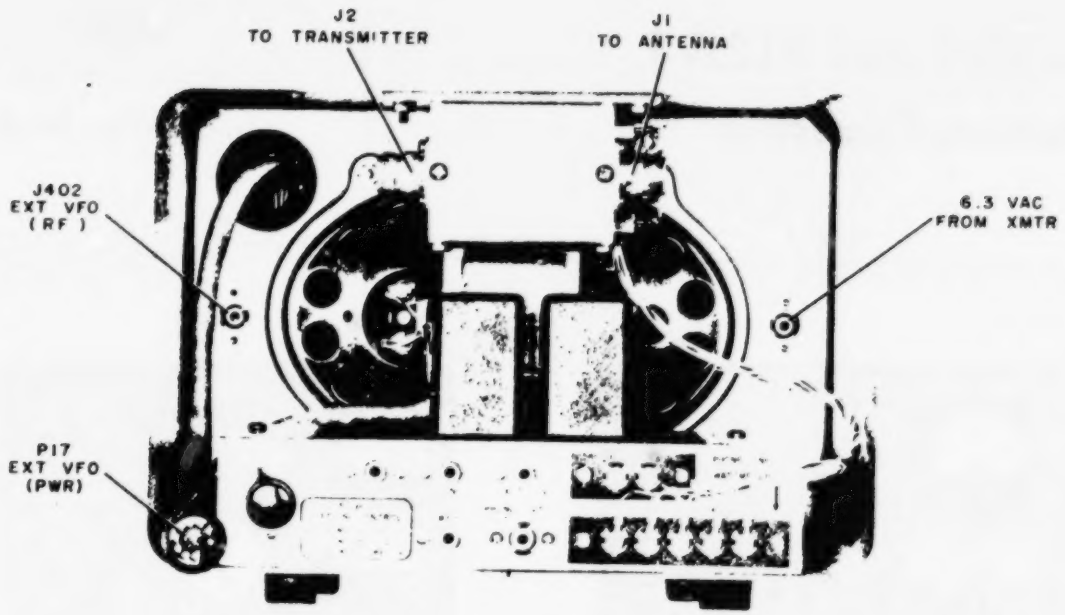



Figure 2. 312B-5, External Connections

C569-04-P

It is accurate to within ±5 percent over the range of 2 to 30 mc. The phone patch uses circuitry which allows VOX phone patch operation. It may also be switched manually if desired. The vfo used in the 312B-5 is a 70K-2 Oscillator which is the same as that used in KWM-2/2A and S-Line equipment. Switching circuits are provided to allow operation of KWM-2/2A Transceivers on different transmit and receive frequencies or transmit-receive operation on the same frequency using either vfo.

Figure 2 shows the location of external connections to the 312B-5. The 312B-4 is similar except for the absence of vfo connections. Items which are furnished with each equipment are listed in table 1.

## 2.1 INSTALLATION.

### 2.1.1 312B-4 WITH S-LINE OR KWM-2/2A.

Make phone patch, speaker, and r-f connections to the receiver, exciter, and telephone lines as shown in figure 3. If desired, the directional coupler may be removed from the 312B-4 and mounted elsewhere. Figure 5 shows 312B-4 and KWM-2/2A interconnections. Figure 6 shows the proper way to reconnect the directional coupler to the indicator circuit.

NOTE

If the phone patch is to be used with a receiver other than an S-Line type, connect the ANTI-VOX IN jack on the 312B-4 to a 500-ohm audio output from the receiver. Connect to the speaker terminals using a 500-ohm-to-voice-coil matching transformer if the receiver has no 500-ohm output. Other types of exciters may be used by connecting the PHONE PATCH OUT jack on the 312B-4 to the exciter microphone jack. The output voltage at this jack on the phone patch is approximately equal to that of the average high-impedance dynamic microphone.

### 2.1.2 312B-5 WITH KWM-2 OR KWM-2A.

Make power, phone patch, speaker, and r-f connections to the transceiver and telephone lines as shown in figure 4. Use the RG-58C/U cables supplied for the r-f connections. These cables are slightly larger in diameter and two inches shorter than those supplied for audio and control functions.

**CAUTION**

Make sure the vfo power plug is plugged into the proper socket on the KWM-2/2A chassis. This socket is J17 which, for normal operation, has a molded jumper plug inserted in it.

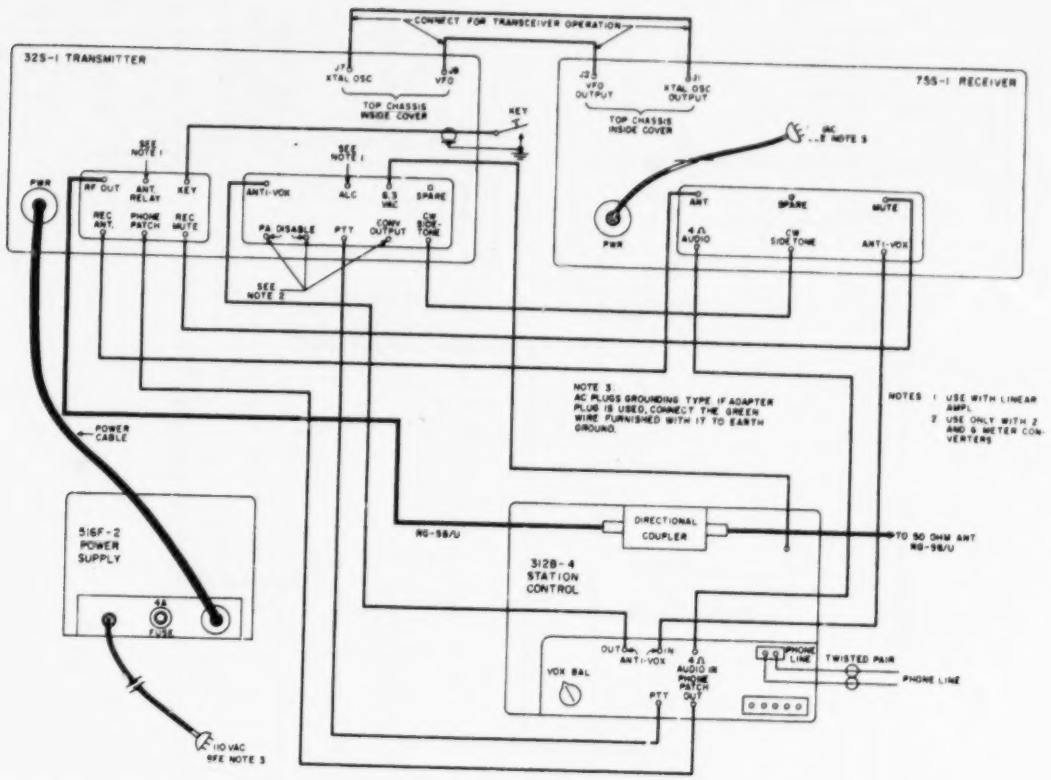



Figure 3. Interconnections, 312B-4 with S-Line

C352-01-4

## 3.1 OPERATION.

3.1.1 PHONE PATCH OPERATION: 312B-4 WITH S-LINE.

a. If the receiver and exciter are set up for transceiver operation, disconnect the patch cables, and restore to fully independent operation.

b. Tune and load the exciter into an antenna or dummy load according to the exciter instruction book.

c. Set the receiver to a different band than that being used by the exciter, and tune to the calibrate signal to produce approximately a 900-cps audio tone.

d. Lift telephone handset, and dial one number to remove the dial tone.

e. Set 312B-4 FUNCTION switch to NORMAL position and PHONE PATCH switch to ON position.

f. With the exciter set up for SSB operation, set the VOX GAIN control to the PTT ON position.

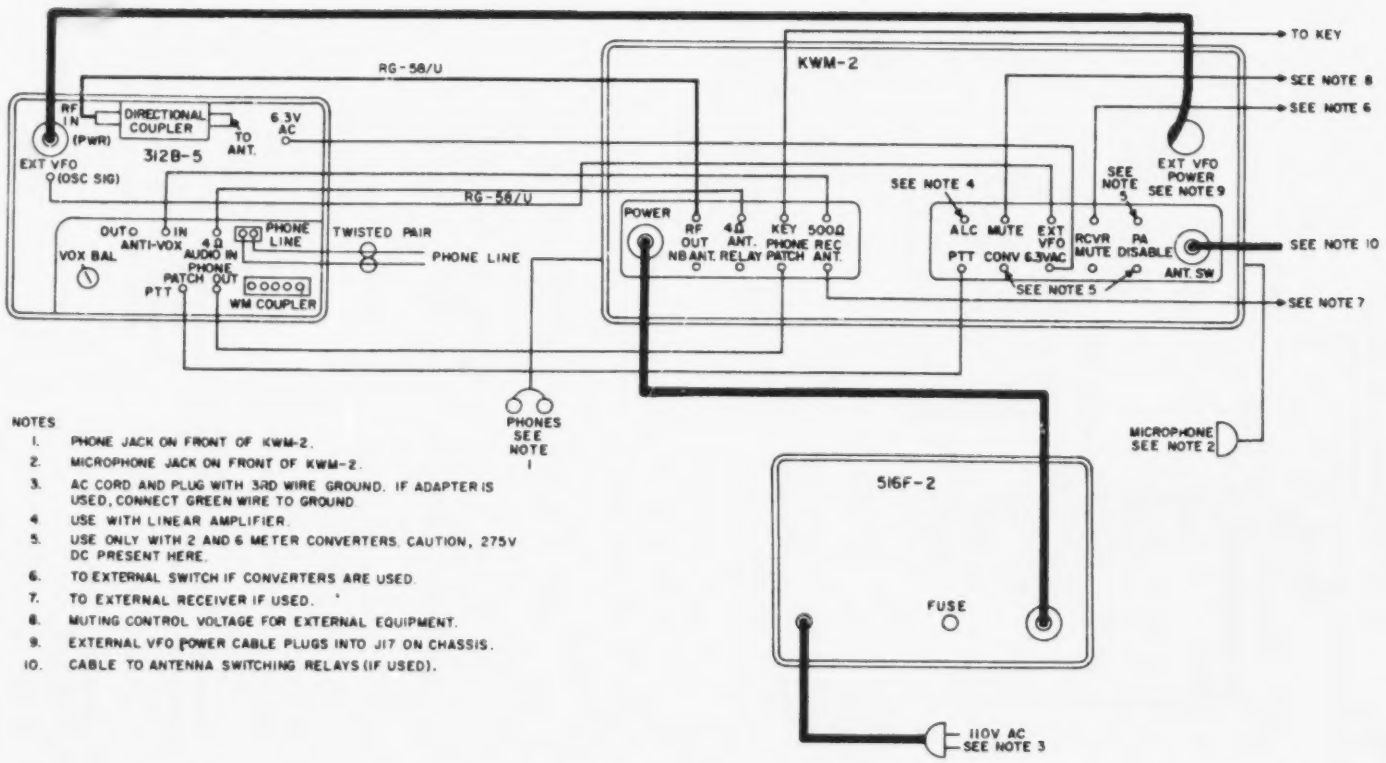
g. The tone from the receiver will now feed through the phone patch and modulate the transmitter. Using the r-f wattmeter to indicate the magnitude of this feedthrough, adjust the VOX BAL control for minimum r-f output. As the null is approached, advance the MIC GAIN control as required to produce a suitable indication on the wattmeter.

NOTE

The phone patch will balance on the average telephone line with the circuit capacities provided. Unusual line conditions may require a change in capacity to compensate for these conditions. If necessary, cut C7 loose, or add the extra capacitor (furnished) in parallel with C6 and C7 to produce a null within range of the VOX BAL control.

h. Hang up telephone, set PHONE PATCH switch to OFF, and reset transmitter and receiver controls for normal VOX operation. Reconnect patch cables for transceiver operation if desired.

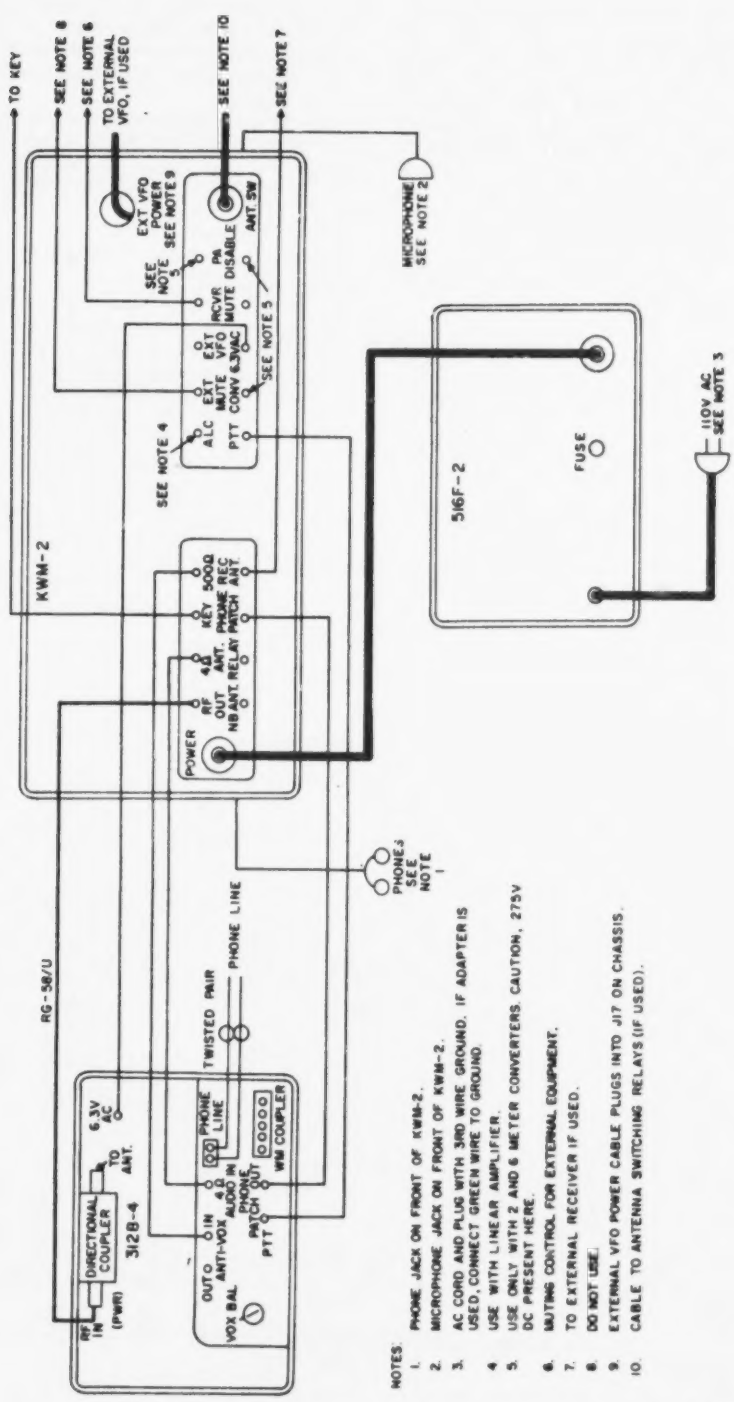
i. The phone patch is now ready for use. The normal operating procedure is to call the third party on the




NOTES

1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. TO EXTERNAL SWITCH IF CONVERTERS ARE USED.
7. TO EXTERNAL RECEIVER IF USED.
8. MUTING CONTROL VOLTAGE FOR EXTERNAL EQUIPMENT.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

Figure 4. Interconnections, 312B-5 with KWM-2/2A




NOTES:

1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. MUTING CONTROL FOR EXTERNAL EQUIPMENT.
7. TO EXTERNAL RECEIVER IF USED.
8. DO NOT USE.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

C487-45-4

**Figure 5. Interconnections, 312B-4 with KWM-2/2A**

telephone, then set the PHONE PATCH switch to ON. If received signals are strong, the receiver RF GAIN may be reduced to minimize background noise. Adjust AF GAIN to provide normal telephone line level.

j. Depending upon telephone line characteristics and the voice volume of the incoming telephone signal, it may be necessary to make slight adjustments of transmitter MIC GAIN and VOX GAIN controls. In the case of extremely weak signals from the telephone line, use push-to-talk operation.

### 3.1.2 PHONE PATCH OPERATION: 312B-4/5 WITH KWM-2 OR KWM-2A.

a. Set EMISSION switch to LSB, ANTIVOX GAIN at minimum, MIC GAIN at minimum, VOX GAIN at minimum, and RF GAIN and AF GAIN as required for normal operation.

b. Set function switch to CAL, and tune in the calibrate signal to produce approximately a 900-cps audio tone.

c. Set VOX BAL control on 312B-4/5 to full counterclockwise.

d. Lift telephone handset, and dial a single digit to remove dial tone.

e. Set PHONE PATCH switch to ON.

f. Advance VOX GAIN control on the transceiver until the VOX relays begin to trip back and forth between receive and transmit positions.

g. Slowly adjust VOX BAL control until the relays stop tripping.

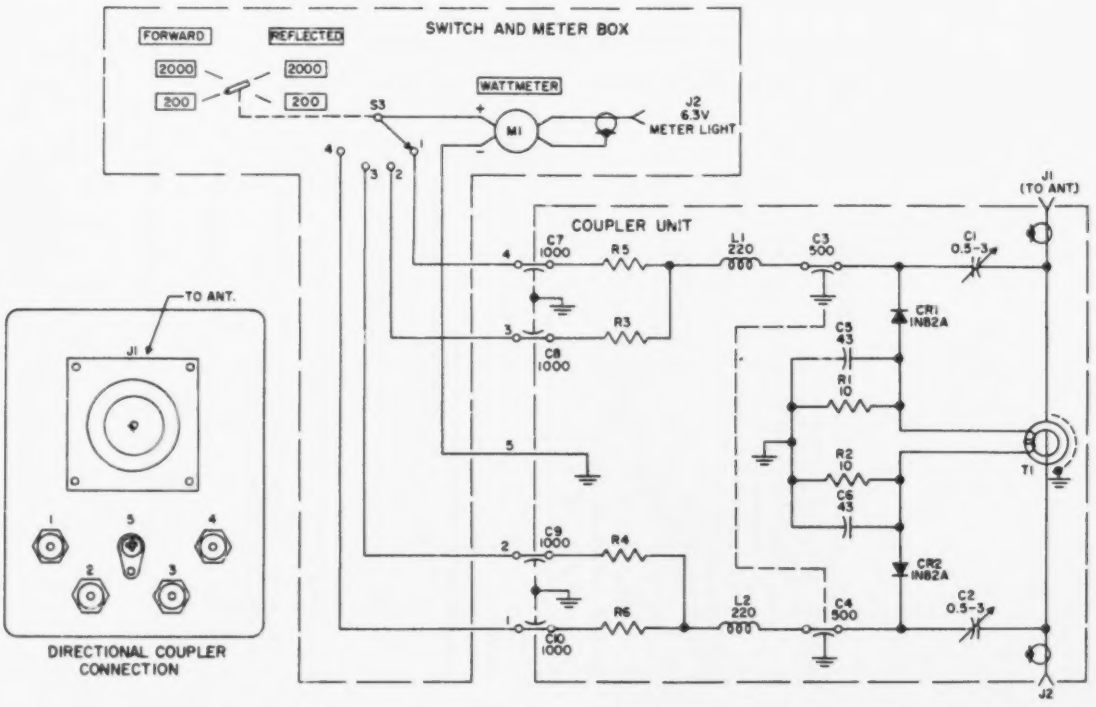
h. Repeat steps f and g until it is no longer possible to advance the VOX GAIN control without causing the relays to trip. (If phone patch will not balance, refer to note accompanying step g of paragraph 3.1.1.)

NOTE

More precise balancing may be obtained if an a-c vtvm is used. Connect the vtvm from the PHONE PATCH OUT jack (J4 on 312B-5) to ground. Slowly adjust the VOX BAL control for a null as indicated by the vtvm.

i. Hang up telephone, turn off phone patch, and reset all transceiver controls for normal VOX SSB operation.

j. The phone patch is now ready for use. Normal procedure is to set PHONE PATCH switch to ST'N MUTE and call the third party on the telephone. Switch the phone patch on, and adjust AF GAIN on the transceiver to provide normal telephone line level. If the




C487-08-4

Figure 6. Wattmeter Interconnections

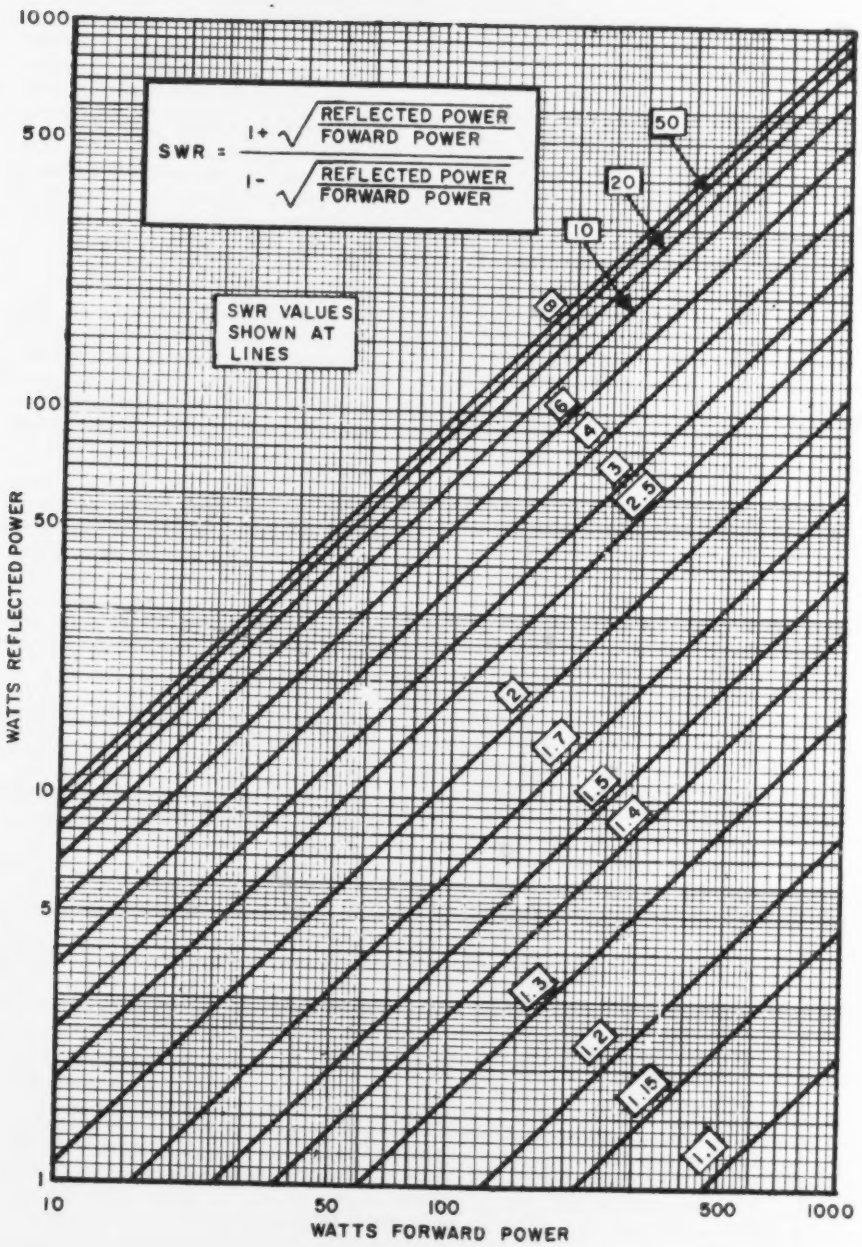



Figure 7. VSWR Graph for Forward Vs Reflected Power

C189-01-1x

received signal is strong, the RF GAIN may be decreased to reduce background noise.

k. Depending upon telephone line characteristics and voice volume of the incoming telephone signal, it may be necessary to make slight adjustments of MIC GAIN and VOX GAIN. In case of extremely weak signals from the telephone line, manually switch the phone patch back and forth from REC ONLY to XMIT ONLY.

### 3.1.3 OPERATION OF DIRECTIONAL COUPLER AND WATTMETER.

The transmitter output power that can be handled safely is relative to the swr on the transmission line. If the swr is extremely high, as when the line is open or shorted, it is possible to obtain a forward power indication of up to two kilowatts with very little power output from the transmitter. To avoid damage to the instrument, carefully observe the following operating procedure:

a. Set the wattmeter switch to the FORWARD 200 position. (If a linear amplifier is being used, set switch to FORWARD 2000 position.)

b. Couple r-f into the transmission line using CW emission. The meter should show a forward power indication. Note the reading.

c. Switch to the appropriate REFLECTED scale. Unless the antenna or load is perfectly matched to the transmission line (52 ohms, resistive), the meter will indicate reflected power. Note the reading.

d. The forward and reflected power readings, in conjunction with the chart of figure 7, may be used to compute vswr. In some cases, it may be convenient to multiply the forward and reflected power readings by a factor of 10. The method of reading swr from the chart remains the same. For example, 50 watts forward and 5 watts reflected result in a value of swr slightly less than 2 to 1. Power levels of 500 watts forward and 50 watts reflected produce the same value of swr.

**CAUTION**

In applications where doubt exists in regard to expected power output from the transmitter, always select the highest wattmeter scale first and, if necessary, switch to the lower scale. This will prevent damage to the indicator.

If the reflected power indication is greater than the forward power indication, it is probable that the coupler unit has been improperly installed. Check to make sure that the coupler has not been installed backwards in the transmission line. Also make sure that the d-c meter leads have not been reversed.

e. If forward and reflected power indications are equal, or reflected power is nearly equal to forward power, the swr on the line is extremely high. This usually indicates a shorted, open, or very poorly terminated line. The coupler will respond to harmonic and other spurious output as well as to r-f output at the desired frequency. If the transmitter output contains a high level of spurious emission, a high swr indication may be obtained even if the transmission line is terminated properly.

### 3.1.4 OPERATION OF STATION CONTROL SWITCHES.

Table 2 lists operating conditions for the various settings of FUNCTION and PHONE PATCH switches in 312B-4 and 312B-5 Station Controls.

TABLE 2. OPERATION OF PHONE PATCH AND FUNCTION SWITCHES

| FUNCTION SWITCH POSITIONS | PHONE PATCH SWITCH POSITIONS | | |
|---|---|---|---|
| | ON | OFF | STATION MUTE |
| NORMAL | Speaker dead, MIC dead, PTT operative, VOX operative, patch connected. | Speaker live, MIC live, PTT operative, VOX operative, patch disconnected. | Speaker dead, MIC dead, transmitter input grounded*, PTT inoperative. |
| RECEIVE ONLY | Speaker dead, transmitter input grounded*, PTT inoperative, MIC dead, patch hears receiver. | Speaker live, PTT inoperative, transmitter input grounded*, patch disconnected. | Same as above. |
| TRANSMIT ONLY | Speaker dead, PTT operative, MIC dead, anti-vox voltage grounded. | Speaker dead, PTT operative, MIC live, anti-vox voltage grounded. | Same as above. |
| *PHONE PATCH OUT jack (J4) shorted. | | | |

3.1.5 OPERATION OF VFO IN 312B-5.

The switch positions of the VFO switch designate the two oscillators as number 1 and 2. Number 1 is the vfo in the KWM-2 (or KWM-2A). Number 2 is the vfo in the 312B-5. The vfo switching arrangement allows instant selection of either of two preset frequencies within the band (one for net frequency and one for net QSY frequency), scanning for a clear channel in case of severe interference, and checking the local transmitter frequency for interference while working d-x.

a. With VFO selector switch in the REC 1 - XMIT 2 position, the receiver frequency is controlled by the dial setting of the KWM-2/2A, and the transmitter frequency is controlled by the dial setting of the 312B-5. This allows the transmit circuits to be set within one portion of the band and the receive circuits within another. For example, with the 312B-5 dial set to 14.296 mc and the EMISSION switch on the KWM-2/2A set to TUNE, the transmit circuts may be peaked and the PA loaded. The EMISSION switch is then set back to the desired sideband or CW, and the KWM-2/2A dial tuned to a desired receiving frequency between 14.3 and 14.350 mc. Refer to table 3.

TABLE 3
KWM-2/2A AND 312B-5 APPROXIMATE VFO FREQUENCY SEPARATION LIMITS

| | BANDS (mc) | | | | |
|---|---|---|---|---|---|
| | 3.4-4 | 7-7.4 | 14-14.4 | 21-21.6 | 28-30 |
| Approximate limit of separation between 312B-5 and KWM-2/2A dials | 15 kc | 30 kc | 50 kc | 75 kc | 100 kc |

b. With the VFO selector switch in the REC 1 - XMIT 1 position, both the receiver and transmitter frequencies are the same and are controlled by the vfo in the transceiver.

c. With the VFO selector switch in the REC 2 - XMIT 2 position, both the receiver and the transmitter frequencies are the same and are controlled by the vfo in the 312B-5. The vfo dial in the 312B-5 can be calibrated in this position using the crystal calibrator signal and zero set knob as outlined in the KWM-2/2A instruction book. With the 312B-5 VFO switch set in REC 1 - XMIT 1 position, the KWM-2/2A may be tuned and loaded to one selected frequency within the legal amateur band using the KWM-2/2A tuning dial. The VFO switch may then be changed to REC 2 - XMIT 2 position, and the 312B-5 dial adjusted to another selected frequency within the same band. Transceiver operation may then be changed instantly from one frequency to the other by operating the VFO switch on the 312B-5 back and forth between the two positions marked REC 1 - XMIT 1 and REC 2 - XMIT 2. This permits presetting to a net frequency and a net QSY frequency, and the instant selection of either during net operation. Frequency separation limits listed in table 1 should not be exceeded by any great extent. If they are exceeded, the result is decreased receiver sensitivity or transmitter PA grid drive (or both) due to the selectivity of the transceiver r-f tuned circuits. The best compromise for this tuned circuit attenuation effect is to tune and load the KWM-2/2A at a frequency midway between the two desired frequencies and then set the 312B-5 and KWM-2/2A dials to the required frequencies.

## 4.1 MAINTENANCE.

4.1.1 GENERAL.

Figure 11 shows the schematic diagram for the 312B-4 and 312B-5 Station Controls. Figures 8, 9, and 10 consist of parts identification and location for the directional coupler and phone patch used in the 312B-4 and 312B-5.

If excessive oscillator drift is experienced, replace V301. The oscillator tube V301 can be replaced without upsetting the calibration accuracy of the oscillator.

For repairs which will affect the calibration of the directional coupler, it is recommended that the unit be returned to the factory or a Collins Authorized Service Agency. Laboratory instruments are used to assure accurate calibration.

4.1.2 VFO DIAL CALIBRATION.

The vfo alignment in the 312B-5 can be adjusted to coincide at the end points (0 and 200) with the vfo in the KWM-2/2A. If necessary, align the vfo in the KWM-2/2A before proceeding with the 312B-5 alignment. Refer to the Service Instructions section in the transceiver instruction book. Align the vfo in the 312B-5 as follows:

a. Set VFO switch on 312B-5 to REC 1 - XMIT 1 position and FUNCTION switch to NORM.
b. Tune to zero beat with calibrate signal at 200 end of KWM-2/2A dial.
c. Set VFO switch on 312B-5 to REC 2 - XMIT 2 position.
d. Tune vfo in 312B-5 to zero beat at the 200 end of dial, and set hairline to 200 with zero set knob.
e. Repeat steps a, b, and c at 0 end of dial in KWM-2/2A.
f. Tune vfo in 312B-5 to zero beat at 0 end of dial. Do not move the hairline. Zero beat should occur within ±1 kc of 0 on the 312B-5 dial.
g. If zero beat does not occur within the limits stated in step f, reduce the end-point spread by adjusting L302 as outlined in the KWM-2/2A Instruction Book.

h. If necessary, loosen the setscrews in the 312B-5 dial hub, and move the dial relative to the oscillator shaft so that the hairline is approximately vertical when the dial is calibrated.

i. Recheck for end-point spread, and make minor adjustment, if required.

j. Make the sideband frequency shift adjustment as outlined in paragraph 4.1.3.

4.1.3 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

a. Set controls of 312B-5 as follows: VFO selector to REC 2 - XMIT 2, FUNCTION selector to NORM.

b. Set controls of KWM-2/2A as follows: BAND switch to 3.6, EXCITER TUNING to approximately 1.9 on logging scale, EMISSION switch to LSB, and OFF-ON-NB-CAL switch to CAL position. Tune dial near 100 until calibrate signal is zero beat. Do not move dial for following procedure.

c. Switch to USB, and adjust trimmer C308 (top of vfo can in 312B-5) for zero beat.

## 5.1 SPECIFICATIONS.

5.1.1 DIRECTIONAL COUPLER AND WATTMETER.

| | |
|---|---|
| Frequency range | 2 to 30 mc |
| Impedance | 52 ohms unbalanced |
| Wattmeter scales | 200 watts, forward<br>2000 watts, forward<br>200 watts, reflected<br>2000 watts, reflected |
| Size | 10-3/4'' w x 7-1/2' h x 11-3/4' d including feet |
| Weight | 8-1/2 lb |
| Maximum power handling capability | 2000 watts forward power |
| Power loss through coupler | Less than 0.1 percent |
| Swr introduced by coupler | Less than 1.05:1 |

5.1.2 PHONE PATCH.

| | |
|---|---|
| Input impedance | 600 ohms |
| Output impedance | 600 ohms |

5.1.3 PM SPEAKER.

| | |
|---|---|
| Impedance | 3 to 4 ohms |
| Size | 5 by 7 inches |

5.1.4 VFO IN 312B-5.

| | |
|---|---|
| Frequency range | 2.5 to 2.7 mc |
| Calibration accuracy | Within 1 kc |
| Drift | Less than 100 cps after 30-minute warmup |
| Dial backlash | Less than 50 cps |
| Power | Supplied by KWM-2 or KWM-2A transceiver power supply. |

## 5.2 OPERATOR'S PREVENTIVE MAINTENANCE INSTRUCTIONS.

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 5.3 and 5.4 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 5.3) outlines functions to be performed daily. These checks and services are to maintain army electronic equipment in combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal conditions are. The References column lists the illustrations, paragraphs, or manuals that contain supplementary information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

## 5.3 DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES CHART.

| Sequence No. | Item | Procedure | References |
|---|---|---|---|
| 1 | End item equipment. | Inspect equipment for completeness. | Fig. 1 and Table 1. |
| 2 | Exterior surfaces. | Clean exterior surfaces, including panel. Check glass on meter and frequency indicator for cracks. | Fig. 1. |
| 3 | Cable connectors. | Check cable connectors for tightness. | |
| 4 | Controls. | While making operating checks (item 5), observe that mechanical action of each control and switch is smooth, and free of internal binding; and that there is no excessive looseness. | |
| 5 | Operation. | Operate equipment in accordance with operating instructions. During operation, be alert for any unusual signs or conditions. | Para 3.1. |

5.4 CLEANING.

Inspect the exterior of the equipment. The exterior surfaces should be clean, and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

Warning: Cleaning Compound (Federal stock No. 7930-395-9542) is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust and dirt from plugs and jacks with a brush.

d. Clean the front panel and control knobs; use a soft clean cloth. Dampen the cloth with water, and use mild soap if necessary.

5.5 ORGANIZATIONAL MAINTENANCE.

a. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing and repair or replacement of parts, subassemblies, or units that inspection and tests indicate probably would fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the second echelon level are made at quarterly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

5.6 QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES PERIODS.

Quarterly preventive maintenance checks and services on the equipment are required. Periodic daily services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750. Perform all the checks and services listed in the quarterly preventive maintenance checks and services chart (para 5.7), in the sequence listed.

5.7 QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES CHART.

| Sequence No. | Item | Procedure | References |
|---|---|---|---|
| 1 | Publications. | See that all publications are complete, serviceable, and current. | DA Pam 310-4. |
| 2 | Modifications. | Determine whether any new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled. | TM 38-750 and DA Pam 310-4. |
| 3 | Installation. | See that equipment is properly installed. | Para 2.1. |
| 4 | Preservation. | Check all surfaces for evidence of fungus. Remove rust and corrosion, and spot-paint bare spots. | Para 5.8. |
| 5 | Terminal board. | Inspect terminal board for cracks and loose terminals. | Fig. 2. |
| 6 | Pluckout item. | See that vacuum tube is seated tightly in its socket. | |
| 7 | Plugs. | Inspect plugs for cracks and for proper seating. | |
| 8 | Cables. | Inspect cables for cracks and breaks. | |
| 9 | Transformers. | Inspect transformers for loose terminals. | |
| 10 | Fuse. | Inspect fuse for proper value and proper seating. | |
| 11 | Resistors. | Inspect resistors for charring and cracks. | Fig. 9 and 10. |

## 5.8 CLEANING AND TOUCHUP PAINTING INSTRUCTIONS.

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9-213.

## APPENDIX

## REFERENCES

The following is a list of applicable references available to the unit repairman of Control, Radio Set C-6118/FRC-93.

| | |
|---|---|
| DA Pamphlet 310-4 | Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders. |
| TM 9-213 | Painting Instructions for Field Use. |
| TM 38-750 | The Army Equipment Record and Procedures. |
| TB SIG 291 | Safety Measures to be Observed When Installing and Using Whip Antennas, Field Type Masts, Towers, Antennas, and Metal Poles that are used with Communication, Radar, and Direction Finder Equipment. |

## 6.1 PARTS LIST.

Note: This parts list is not an authorization for requisitioning; it should be used for reference only.

| ITEM | DESCRIPTION | COLLINS PART NUMBER |
|---|---|---|
| | 312B-4 STATION CONTROL<br>312B-5 STATION CONTROL | 522-1167-00<br>522-1668-00 |
| C1 | CAPACITOR, FIXED, PAPER: 1 uf +20% -10%, 200 vdcw | 931-0170-00 |
| C2, C3<br>C4, C5 | CAPACITOR, FIXED, CERAMIC: 470 uuf +100 -20%, 500 vdcw | 913-3007-00 |
| C6 | CAPACITOR, FIXED, PAPER: 0.5 uf +20% -10%, 200 vdcw | 931-0169-00 |
| C7 | CAPACITOR, FIXED, PAPER: 0.25 uf +20% -10%, 200 vdcw | 931-0168-00 |
| J1 | JACK, TELEPHONE: spring leaf, 2 conductor plug | 358-1050-00 |
| J2, J3<br>J4, J5<br>J6, J7 | JACK, TIP: ceramic insulation, phonograph type | 360-0088-00 |
| L1, L2 | COIL, RADIO FREQUENCY: 2 mh, 50,000 ohms; 100 ma current rating | 240-0134-00 |
| LS1 | LOUDSPEAKER, PERMANENT MAGNET: 4-9 w, nom. 3-4 ohms, 5 x 7 in. oval | 271-0215-00 |
| M1 | AMMETER: D'Arsonval movement dc, internally illuminated | 458-0467-00 |
| R1, R2<br>R4, R5<br>R6<br>R9 | RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w | 745-1310-00 |
| R7 | NOT USED | |
| R3, R8<br>R10 | RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 1/2 w<br>RESISTOR, VARIABLE, COMPOSITION: 2500 ohms ±30%, 1/4 watt | 745-1349-00<br>378-4728-00 |
| R11, R12 | RESISTOR, FIXED FILM: 619 ohms ±1%, 1/2 w | 705-7586-00 |
| R13, R15 | RESISTOR, FIXED, COMPOSITION: 390 ohms ±10%, 1/2 w | 745-1335-00 |
| R14, R16 | RESISTOR, FIXED, COMPOSITION: 270 ohms ±10%, 1/2 w | 745-1328-00 |
| S1 | SWITCH, LEVER: 3 pole, 2 position (used in 312B-4 only) | 259-0988-00 |
| S1 | SWITCH, LEVER: 3 pole, 3 position (used in 312B-5 only) | 259-1132-00 |
| S2 | SWITCH, LEVER: 5 pole, 3 position (used in 312B-4 only) | 259-0987-00 |
| S2 | SWITCH, LEVER: 5 pole, 3 position (used in 312B-5 only) | 259-1131-00 |
| S3 | SWITCH, ROTARY: 1 circuit, 4 position, 1 section | 259-0966-00 |
| T1, T2 | TRANSFORMER, AUDIO FREQUENCY: 200 to 20,000 cc freq range | 667-0326-00 |
| | Directional Coupler | 543-8118-004 |
| C1, C2 | CAPACITOR, VARIABLE, GLASS: 0.5 uf min, 3.0 uuf max., concentric type | 922-0149-00 |
| C3, C4 | CAPACITOR, FIXED, MICA: 500 uuf ±20%, 500 vdcw | 913-0667-00 |
| C5, C6 | CAPACITOR, FIXED, CERAMIC: 43 uuf ±1%, 500 vdcw; | 918-4875-00 |
| C7, C8<br>C9, C10 | CAPACITOR, FIXED, CERAMIC: 1000 uuf +80% -20%, 500 vdcw | 913-1292-00 |
| C11 | NOT USED | |
| C12 | NOT USED | |
| CR1, CR2 | SEMICONDUCTOR DEVICE, DIODE: silicon; type 1N82A | 353-2543-00 |
| J1, J2 | CONNECTOR: R-f type N, UG-58A/U | 357-9003-00 |
| L1, L2 | COIL, RADIO FREQUENCY: 200 uh inductance; 1 amp | 240-0037-00 |
| R1, R2 | RESISTOR, FIXED FILM: 10 ohms ±1%, 1/2 w | 705-2356-00 |

| ITEM | DESCRIPTION | COLLINS PART NUMBER |
|---|---|---|
| †R3, R4 | RESISTOR, FIXED, FILM: 5,100 ohms to 10,000 ohms ±1%, 1/4 w, IRC type MDB | 705-7130-00 to 705-7144-00 |
| †R5, R6 | RESISTOR, FIXED, FILM: 787 ohms to 1780 ohms ±1%, 1/4 w, IRC type MDB | 705-7091-00 to 705-7108-00 |
| T1 | COIL, RADIO FREQUENCY: 60 turns of #30 AWG toroidal wound; | 542-0916-002 |
| | 70K-2 Oscillator | 522-1093-00 |
| | 70K-2 Oscillator consists of the following. This equipment should be returned to Collins Radio Company for repair. | |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0053-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0054-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0055-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0056-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0057-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0058-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0232-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0233-00 |
| *C301 | CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw | 913-0234-00 |
| C302 | CAPACITOR, MICA: 1000 uuf ±2%, 500 vdcw | 912-1737-00 |
| C303 | CAPACITOR, MICA: 3000 uuf ±1%, 500 vdcw | 912-1748-00 |
| C304 | CAPACITOR, MICA: 200 uuf ±2%, 500 vdcw | 912-0514-00 |
| **C305 | CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw | 913-0074-00 |
| **C305 | CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw | 913-0246-00 |
| C306 | CAPACITOR, CERAMIC: 0.02 uf +80% -40%, 250 vdcw | 913-2097-00 |
| C307 | | |
| C309 | | |
| C310 | | |
| C308 | CAPACITOR, VARIABLE, CERAMIC: 5 uuf min. to 37.5 uuf max. 350 vdcw | 917-1073-00 |
| CR301 | SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N34A | 353-0103-00 |
| L301 | COIL, RADIO FREQUENCY: 23 turns #28 AWG double formvar, 2.4 uh inductance | 240-0852-00 |
| L302 | TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware | 543-7323-00 |
| L303 | INDUCTOR, TUNING: 10 turns #30 AWG wire | 543-7333-003 |
| L304 | COIL, RADIO FREQUENCY: single layer wound, magnet wire, 3.30 uh | 240-0895-00 |
| R301 | RESISTOR, COMPOSITION: 0.10 megohm ±10%, 1/2 w | 745-1436-00 |
| R303 | | |
| R302 | RESISTOR, COMPOSITION: 82,000 ohms ±5%, 1/2 w | 745-1432-00 |
| T301 | TRANSFORMER, RADIO FREQUENCY: pri 360 uh nom 790 kc; sec 2.7 uh nom, 2.8 mc | 240-0865-00 |
| V301 | ELECTRON TUBE: type 6AU8 | 255-0202-00 |
| | Following parts used in 312B-5 only: | |
| DS401 | LAMP, INCANDESCENT: type 47 | 262-3240-00 |
| J402 | JACK, TIP: ceramic insulation, phonograph type | 360-0088-00 |
| P17 | CONNECTOR, POWER: 9 male contacts, fits miniature tube socket | 372-1822-00 |
| R401 | RESISTOR, COMPOSITION: 15,000 ohms ±10%, 1 w | 745-3401-00 |
| R402 | RESISTOR, COMPOSITION: 33,000 ohms ±10%, 2 w | 745-5715-00 |
| S401 | SWITCH, ROTARY: 3 pole, 3 position | 259-1108-00 |

*Chosen per operational requirement.
**Selected in final test.
†Selected in manufacture to calibrate meter.

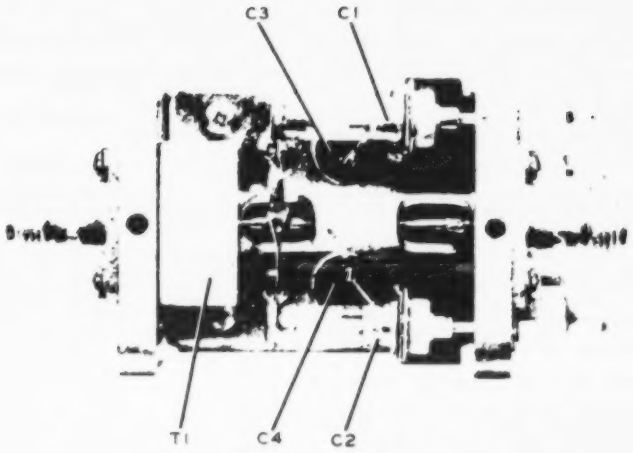



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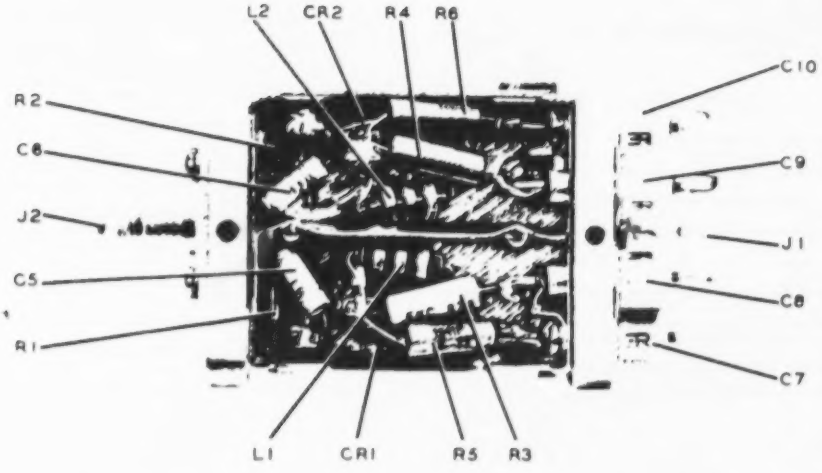
Figure 8. Directional Coupler, Top View, Parts Location




C487-16-P

Figure 9. Directional Coupler, Bottom View, Parts Location

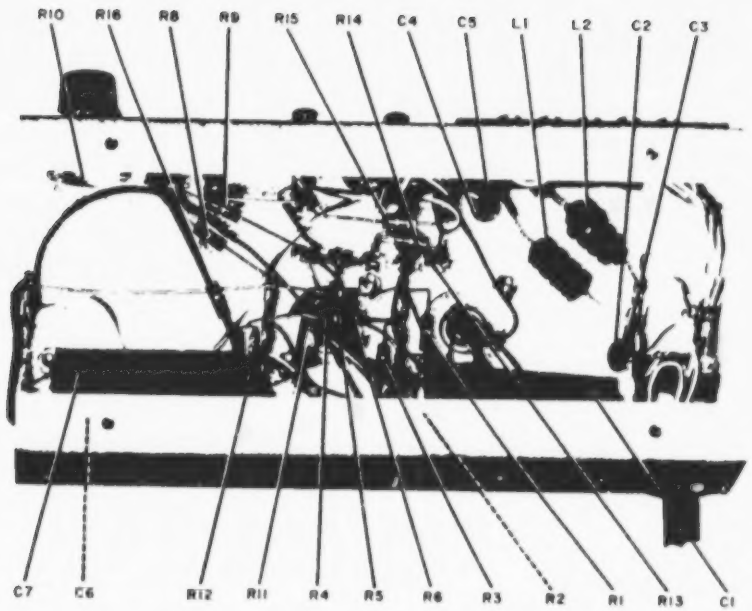



Figure 10. Phone Patch, Bottom View, Parts Location

C369-05-P

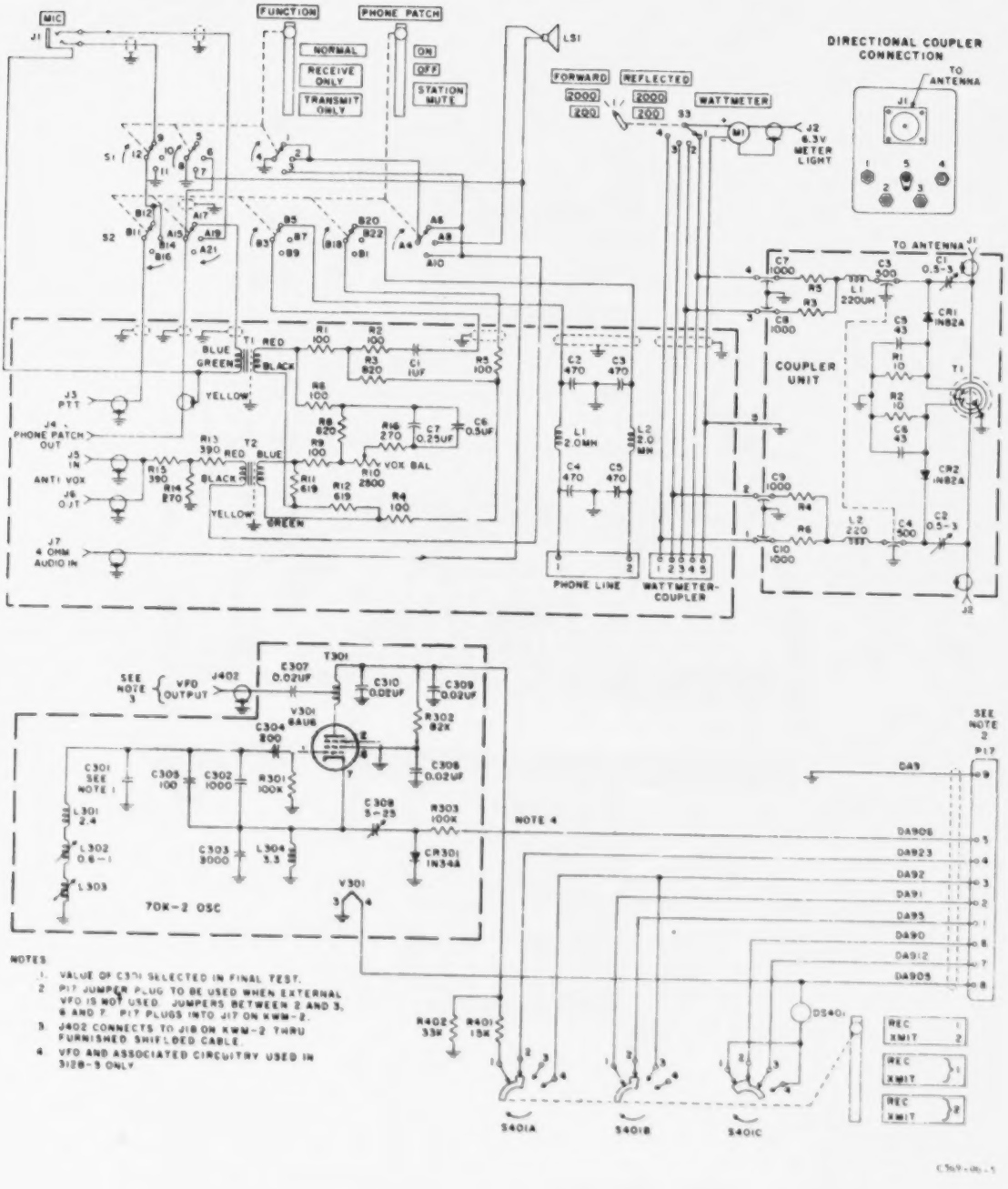



Figure 11. 312B-4 and 312B-5, Schematic Diagram

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *25 June 1964*

TM 11-5820-530-15, is published for the use of all concerned.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
*General, United States Army,*
*Chief of Staff.*

Official:

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*Major General, United States Army,*
*The Adjutant General.*

Distribution:

*Active Army:*

USASESCS (2)
USAECOM (15)
USASCS (75)
11th Sig Gp (35)

*NG:* None.

*USAR:* None.

For explanation of abbreviations used, see AR 320-50.

* U.S. GOVERNMENT PRINTING OFFICE: 1990 - 262-912 (30695)